# Design analysis of Educational Technologist's Web-Based Teaching and Learning environments in South African Higher Education institutions

BY


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Thesis

Submitted in fulfilment of the requirements for the degree of

Doctor of Education (Educational Technology)


In the School of Education Studies
In the Faculty of Education

University of KwaZulu-Natal, South Africa


May 2009

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# DECLARATION

I declare that the dissertation hereby submitted to the University of KwaZulu-Natal for the degree of Doctor of Education has not been previously submitted by me for a degree at any other University. I further declare that this dissertation is my own work in design and execution, and that all material contained therein has been duly acknowledged.

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Signature Date

# Acknowledgements

I would like to acknowledge the following individuals for their valuable contribution and support:

- Prof. P. Ramrathan (Promoter)
- Dr. D. Govender (Ed. Tech Specialist)
- Prof. G. Kistan (QA)
- Prof. A. Amory (ICT Education)
- Rishi Hansrajh (Head of MMLC)
- Ajay Heeralal (MMLC Technical specialist)
- Dave Wiles, EM Mgqwashu and Christine Davis (Media 4 Change) (Editors) (Appendix xiii)

# Dedication

This study is dedicated to all my family members for their spiritual support.

# ABSTRACT

According to Goldstuck (2008), there were 4.6 million Internet users in South Africa for 2008 year-end. This corresponds to a penetration rate of 10.5% based on an estimated South Africa population of 43.8 million (.internetworldstats.). Given this popularity, this qualitative case study has analysed the design of Web-Based Teaching and Learning (WBTL) environments designed by Educational Technology facilitators in South African higher education institutions. The conceptual and theoretical framework for this study presents Activity Theory (AT) as a theoretical framework together with constructivist learning. It also presents the different qualities and skills utilised for WBTL facilitators.

AT involves three levels in a form of a hierarchy. The three levels are “the uppermost level of activity is driven by an object-related motive (or objective) [activity level]; the middle level of individual or group action is driven by a goal [action level]; and the bottom level of automatic operations is driven by the conditions and tools of action at hand [automatic operation]” (Engestrom, Miettenin & Punamaki, 1999)

Constructivism is used as a theory of inquiry. The strength of constructivism was found to be in the five basic themes identified by Mahoney (2005), six elements of constructivism discovered by Gognon and Collay (1999), levels of interaction identified by Anderson and Elloumi (2004) and components of effective Web learning and characteristics of projects or tasks. The main

components of effective Web learning are student preparation, student activities, student interaction and student transfer.

While working with the Web in teaching and learning this study proposed the concept of considering The Tree Three Rings Theory (TTTRT) to be used as a solution for the practice. TTTRT works with the three schools of thought (behaviourism, cognitivism and constructivism). The three rings are: (1) the use of search engines in teaching and learning (easiest ring), (2) use of Learning Management System in teaching and learning (LMS) (easier ring) and (3) designing the Web for learning (programming) (the most challenging ring).

The analysis of Web for learning was done by incorporating the theoretical frameworks and theories of learning; the facilitators' frames of reference; objects; tools; rules; community; division of labour; levels of operation; and the pedagogical issues.

It can be concluded that South Africa has a special need for Web-Based Teaching and Learning (WBTL) or Web learning to take the formal education to those citizens that cannot attend full-time classes.

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## List of Acronyms

| | |
|---|---|
| ARPA | Advanced Research Projects Agency |
| AT | Activity Theory |
| CD | Compact Disc |
| e-Learning | Electronic Learning |
| ELMN | Electronic Learning, Management and Needs |
| Email | Electronic mail |
| EPSS | Electronic Performance Support System |
| ET | Educational Technology |
| FTP | File Transfer Protocol |
| HCI | Human Computer Interaction |
| HTML | Hypertext Markup Language |
| ICT | Information and Communication Technology |
| IM | Instant Messaging |
| IRC | Internet Relay Chat |
| ISD | Instructional Systems Design |
| LMS | Learning Management System |
| N3 | Notation 3 |
| nd | Not dated |
| OBE | Outcomes-Based Education |
| RDF | Resource Description Framework |
| RSS | Really Simple Syndication |
| SME | Subject matter experts |
| TIE | Technology in Education |
| TOE | Technology of Education |
| TTTR | The Tree Three Rings |
| TTTRT | The Tree Three Rings Theory |
| URI | Uniform Resource Identifier |
| US | United State |
| WBTL | Web-Based Teaching and Learning |
| WWW | World Wide Web |

## Conventions used

| | |
|---|---|
| Programme: | is used to represent a programme of study and any other activity according to usual dictionary definitions. |
| Program: | is used to represents a computer program. |

# CHAPTER 1
## THE SCOPE OF THE STUDY

### 1.1 INTRODUCTION

The Information and Communication Technology (ICT) revolution is currently permeating every facet of people's lives. The speed with which people communicate, the medium through which people communicate, and the frequency with which people communicate, are together governed by the click of a mouse, voice recognition and, to an extent, wireless broadband technology. The extent of influence that ICT has on education means that global knowledge, learning environments, and ways of understanding, are available to all who have access to the electronic medium of choice. Of particular importance in this study is how ICT influences teaching and learning within educational settings. Traditionally, learning environments rely on either a contact mode or distance mode of teaching and learning.

Nowadays, other modes of teaching and learning have emerged, and this points to a continuum of teaching and learning modes where contact modes and distance modes are in the opposite ends of the continuum. The challenge then is to exploit this continuum - the nature of teaching and learning that influences educational endeavours. ICT, theoretically, is contained in this continuum nature of teaching and learning activities. Is it a useful means of teaching and learning? What are the challenges and opportunities for ICT to be exploited as a mode of teaching and learning? It is such questions that this dissertation attempts to answer in order to contribute to the discourses relating to the challenges and opportunities of using ICT as a teaching and learning mode.

Other countries around the world have taken advantage of the ICT opportunities by introducing new policies that helped their education and training institutions to use the ICT tools effectively in teaching and learning.

One example of these countries is Brazil. Its President, Luiz Inacio Lula da Silva, instructed all ministries and state-run companies to switch from Microsoft costly operating systems to free operating systems in order to facilitate relatively

inexpensive opportunities to exploit ICT potential (Benson, 2006). Benson (2006) also noted that Brazil became the first country to instruct all the sectors that receive Government financial support to develop open source software with codes that are free to all. Education institutions benefited from the change to open source because they managed to attract even those who could not attend as full time students or to come to face-to-face classes. Education and training ended up going to the people instead of people going personally to education and training institutions. Other institutions (such as those that are using the Sakai as mentioned in Chapter 2), through the open source operating systems, became a virtual education and training institution that enabled people to access learning without physically going to these institutions (Hardin, 2006).

Many international education institutions have used ICT to their advantage. One of these institutions, for example, is Athabasca University in Canada. It used the Web in teaching and learning to triple its graduation rate (Anderson & Elloumi, 2004). The institution had to find innovative ways to save itself from the Government of Alberta's threat to reduce the institution's subsidy by 31%. According to Anderson and Elloumi (2004), today the institution is enjoying every moment of its teaching and learning situation by serving about thirty thousand (30 000) students annually.

Similarly, South Africa has explored the potential that ICT can offer. The Government of South Africa, for instance, introduced the Draft White Paper on e-Education (as a policy in August 2004) to direct all the schools to use ICT in teaching and learning (Asmal, 2003). Educational and training institutions in South Africa are expected to transform the whole educational and training systems by incorporating ICT into their teaching and learning. The e-learning policy indicates that by 2013 all schools in South Africa will become e-learning ready. The fundamental reason for the implementation of the e-learning policy is aimed at transforming traditional education which has been characterised by a lack of ICT resources (Asmal, 2003). Within the South African context, the transformation process put pressure on higher educational and training institutions because they are widely recognised as one of the most complex organisational forms (Makgoba, 2005). If they do not lead the transformation

process, they will be left behind in the swirl of rapid technological change (Resta, 2002). The Internet (Web) (as a main part of the ICT) is one of the fastest growing technologies in the world. This electronic communication tool (such as the email and the web) will continue to influence the educational / training sectors because their common goal is to achieve world class education and training.

The Internet, mainly the World Wide Web (WWW) or Web, remains one of the most important innovations in teaching and learning. According to Eugene and Provenzo (1999, p.1) “the WWW is radically redefining how [facilitators / students] obtain information and the way they teach and learn as the world can be literally brought into the classrooms or living rooms.” It is within this context that the researcher believes that the Web is the most powerful tool that shapes education globally, especially Educational Technology as a field of study. This does not mean, however, that only educational technologists should be involved. Other disciplines also have similar roles to play in helping students overcome the huge barrier in learning and interpersonal communication (Rhoton, 2002).

Such a barrier can only be overcome by the Internet (Web). This tool has the “ability to transfer information across a spatial expanse [which] is a very important goal of communication [in education],” Rhoton (2002, p.4). The Internet combines almost all users’ senses through audio and visual presentation and helps users to understand different concepts or terms (this also includes the use of search engines). It is because of this technology that users use multi-media to communicate with others worldwide.

Shulman (2001) adds that academics from other disciplines should contribute by engaging in the scholarship of teaching that is aimed at developing the roles of human facilitators and digital technologies in higher education.

Higher education institutions all over the world have bought into the idea of using the Web in teaching and learning and have combined this with theories / pedagogies developed for the Web (Herrington, Reeves & Oliver, 2004). Out of

extensive research, Oliver and Herrington (2001) conclude that higher education institutions cannot escape using the Web in learning contexts. It is out of their research that this study argues that some of the common reasons for using the Web in teaching and learning are to enhance learning, its flexibility and its cost effectiveness (in terms of using soft copies instead of wasting a lot of money on papers).

Power and Thomas (2006) state that Web learning enhances understanding of the subject matter because it combines a variety of different types of resources used to facilitate learning. The flexibility of Web learning assists educational institutions to facilitate courses online through the Web. In addition to taking advantage of this flexibility, institutions automatically save on costs because Web learning has the ability to be scaled for mass teaching and learning. This suggest that while the opportunities for utilizing Web learning programmes by educational institutions are there for facilitators to take advantage of, one needs to construct these teaching and learning opportunities within pedagogically sound principles and theories. What informs these teaching and learning principles and theories is the subject of this dissertation.

## 1.2 RATIONALE

The results of the study could be useful to the higher education institution facilitators and community, the Government and Non-Governmental Organisations (NGOs). South Africans need good training and retraining (lifelong learning), so that they are able to deconstruct and critically analyse Web technologies in teaching and learning with a good understanding of the Web facilitators' interests in their minds. The Web in teaching and learning is believed to be one of the most powerful tools to help South Africa in the training and retraining (Asmal, 2003)

The results of this study could help in the development of Educational Technology in South Africa and Africa, because modules or programmes of this specialisation are now offered online by most developed countries. In order to teach most Educational Technology courses one needs adequate knowledge

and skills in the use of the Web technologies. As a result of this need, the Southern African Network for Educational Technology and e-Learning (SANTEC) was introduced by Educational Technologists from African countries to share ideas in terms of the Web (technology) usage in order to facilitate learning and teaching.

> SANTEC aims to be an enabling network for Educational Technology practitioners with an interest in Educational Technology through Electronic Learning (e-Learning) (via the Web) in developing environment – with an initial focus on Southern Africa. This mixture was to support and facilitate collaborative ventures and effective synergies amongst the members. There is a growing need to develop Educational Technologists and e-Learning professionals through contextualised education and training programmes in the region and other developing environments (Opali, 2004).

Any Educational Technology facilitator or student can access the SANTEC at ://www.santecnetwork. and become a member. The researcher is also a member of the SANTEC and attends SANTEC seminars online every month. Different themes are presented for discussion in each seminar. As a result of these seminars the researcher was encouraged by other members to conduct a study on the use of the Web (technologies) in teaching and learning in South Africa. One of the main issues that were identified were some of the designs of the Web for learning were inadequate when one considers the pedagogical issues. The scope of the research is limited to the Educational Technology discipline, although designs of the Web (technology) influence other disciplines as well.

The development of Educational Technology may influence other specialisations to enable them to compete internationally. The researcher is of the view that education in South Africa and Africa should be part of this new inclusive Semantic Web that is being developed. Therefore, this study attempts to facilitate this process and hoping to identify theories or pedagogies that can

be applied when using the Web (technologies) in teaching and learning in South Africa (Southern African Theories).

The Semantic Web (as discussed in Chapter 2 under Web 3.0) is a mesh of information linked up in such a way as to be easily processed by machines, on a global scale. It is an efficient way of representing data on the World Wide Web (WWW). The Semantic Web is Tim Berners-Lee's (Inventor of the WWW) idea. There is a team that was tasked to work on this project in order to accommodate many languages, publications and tools. "The Semantic Web technology is still very much in its infancy, although the future of the project in general appears to be bright" (Brickley, 2004, p.9).

This means then that any information that is hidden away in Hyper Text Markup Language (HTML) will be disclosed once the project is finished. The researcher believes that if the Semantic Web can be defined by Berners-Lee, Hendler and Lassila (2001) as an extension of the current Web, which is being reshaped to accommodate reusing and sharing of data across application, it should become more powerful than the existing Web. It is also expected to encourage computers and people to work in cooperation, which is good for Web learning.

This study is important, because South Africa has to contribute towards the development of the Semantic Web which is a part of Web 3.0.

This study is trying to understand this problem by exploring the rules and theories for the design of Web learning. The study aims at identifying rules and critically analyses them with the aim of understanding the theories that influence Web learning.

The new mode of delivery that is being created by the Web has the following advantages:

- "It offers significant opportunities to higher education institutions to enhance the quality, accessibility and cost effectiveness of the higher education teaching and research" (West, 1998, p.60). There is no need for the students to be at the same place at the same time, because the

Web brings a massive set of information resources or educational library to them.

- It is also available twenty-four hours a day for seven days (24/7) a week and a user can have access to the educational libraries of different web servers. The Web is available at any higher education institution in South Africa to offer students a cheaper or free dial-up access. For example, West (1998) indicates that in Australia (during the 1990's) it was necessary to use emerging technology in education to improve learning situation. It was necessary that universities "are committed to making the best possible use of the emerging technologies to ensure Australia provides high quality education to its domestic and international students wherever they are located" (West, 1998, p.45). In other words, this indicates that if one wants to create a situation where s/he can take education to people, instead of people to education, one needs to use the Web in most cases. In addition, the 24/7 access to the user facilitates global discourses without the constraints of timing of interaction through the Web. Different parts of the globe have different sleeping and waking times and this will now not become a factor in global access to the Web.

Therefore, it is important that South African higher education institutions use the Web (technology) to their advantage in order to act as role model for schools. This study analyses the design of Web-Based Teaching and Learning environments designed by Educational Technology facilitators to facilitate learning in South African Higher Education Institutions, because one needs to understand how the Web functions before s/he gains any control over it and decide its relevance to South African context and institutions.

The purpose of this study, then, is to explore (and analyse) the design principles used by Education Technologist in the design of Web-Based Teaching and Learning environments used in South African Higher Education Institutions. Therefore, the following three critical questions have been identified to lead the study.

## 1.3 CRITICAL QUESTIONS

This study has the following three critical or key questions:

a. What are the experiences of Educational Technology facilitators regarding the use of web technologies to promote Web-Based Teaching and Learning (WBTL)?
b. What teaching and learning philosophy informs the design of Web-Based Teaching and Learning (WBTL) environments?
c. How do students experience learning through the WBTL environment?

## 1.4 LITERATURE REVIEW

According to Internet World Stats (www.internetworldstats.com, 2007), latest statistics (updated 30-09-2007) reveal that there are 1.2 billion internet (Web) users of 6.6 billion population in the world; in South Africa, the number of internet users in 2007 is 5.1 million (10.3%) of 49.7 million population. As a result of this popular Web usage, in education and training WBTL has become one of the major topics of discussion amongst researchers at higher education institutions (Wilborn, 1999).

White and Weight (2000) emphasise the importance of facilitators' frames of reference (personal qualities, knowledge, skills and facilitation experience) that need to be considered if one wants to be successful in using the Web to facilitate learning. Reeves, Herrington and Oliver (2002) add that WBTL environment should have sound theories in order to produce quality or effective learning. As a result of this discussion Anderson and Ellioumi (2004) recommend the three schools of thought (behaviourism, cognitivism and constructivism) to be considered in any WBTL environment. Although these schools of thought are powerful in influencing WBTL environment but according to Kumar (1997) systems approach has long been influencing the whole field of Educational Technology (ET) working hand in hand with these three schools of thought.

## 1.5 CONCEPTUAL AND THEORETICAL FRAMEWORK

This study began with Activity Theory (AT) as a theoretical framework as well as the categories for analysis. AT was used for this study because it provides a descriptive framework for Human Computer Interaction (HCI) through which facilitators can better understand and classify the cognitive, physical and social processes involved in performing specific tasks, and how those tasks can be related to a larger motivating activity (Waite, 2005). Since the paradigm for this study is an interpretive paradigm, AT has worked well in framing this study because it does not predict the future but it provides a descriptive framework for understanding any motivating activity (Nardi, 1996).

This study used Guided Analysis, as recommended by Freeman and Richards (1996), in order to modify the categories of AT. As a result of this guided analysis, the researcher was forced by the data to use some issues of constructivism that were identified by Gognon and Collay (1999).

AT, like most other theories, has different models that were developed by different researchers like Vygotsky (1981). It was later reformulated by others like Engestrom (1999) into a classic model of Activity Theory (as discussed in Chapter 3).

Constructivism emphasises the use of students' previous experience to construct new knowledge. Constructivists believe that meaning exists within people rather than in external forms. It mainly aims at an ongoing structuring processes resulting in constructing knowledge. Constructivists also believe that reality is constructed through human activity. That is why Kukla (2000) stated that reality is something that cannot be discovered by anyone, because it does not exist prior to its social invention. So, there must be a social group that can construct reality otherwise there will be no reality.

Another theory that contributed towards this study is Transformative Learning Theory (TLT). Mezirow (1990) identified the three main important components of Transformative Learning Theory that one has to consider if one wants to apply the theory in any practice. The main components are disorienting

dilemmas, critical reflection and the ‘identification of psychic assumptions’. Under these three conditions an individual can transform firstly, by revisiting and interact with his or her existing frames of reference. This transformation process happens if, firstly, one is facing a new challenging situation. Secondly, through new frames of reference that may lead to the transformation of one’s habits or point of view.

## 1.6 METHODOLOGY

The methodology presents the following aspects: research development and processing steps; research approach, sampling method and research instruments. Categories for analysis are also indicated.

Herrington, Reeves and Oliver (2004) identified four phases or principles of the development or design of research in their study. The phases are (1) analyses of practical problems, (2) development of solutions, (3) testing the solutions and (4) documentation together with reflection. Development research was used for planning and processing this study in order to get a clear direction of what should happen. The fifth phase that emerged from the planning and processes of this study is solution implementation (Figure 3.1).

According to Creswell (1998), quantitative and qualitative research is desirable in social sciences as it allows for incremental data collection, i.e. adopting a mixed mode methodology results in ‘rich data” collection methods. The researcher opted for the interpretative design mode in order to better understand the perceptions of participants in the way they plan, design, utilise and evaluate Web-Based Teaching and Learning (WBTL) environments.

The researcher thus felt that a combination of both qualitative and quantitative research is most appropriate for this study as it involves gaining an in-depth knowledge and deeper critical understanding on the design of WBTL environments (Potter, 2002).

This research is a case study of WBTL environments designed by the eight facilitators chosen for this study from the four universities which were named INSTITUTION 1, INSTITUTION 2, INSTITUTION 3 and INSTITUTION 4 because of importance of confidentiality. Bertram (2004) sees the case study as it falls under the umbrella of naturalistic research which is conducted in real-world contexts used by researchers in the interpretive paradigm. The researcher believes a case study is relevant in conducting this study, because it is suitable in the investigation of one or more entity, which is defined and characterised by time and space (Bertram, 2004). In terms of sampling, the case study approach led the researcher to apply the snowball sampling method. The snowball sampling was used because only few university facilitators use the Web in teaching and learning in South Africa.

This study started with convenience sampling (where the most convenience or accessible universities were selected) followed by snowball. Snowball sampling is a non-probability sampling scheme in which one begins by sampling one person, then asking that person for the names of other people one might interview, then interviewing them and obtaining a list of people from them, and so on.

Bertram (2004) indicates that sampling involves making decision about which people, settings, events or behaviours to observe and what will be studied depends on the unit of analysis. The unit of analysis may be in a form of a group, an individual or an organisation. For this study the unit of analysis is a group of facilitators and students. The researcher wrote letters and emailed them to the participants and their institutions to ask, where they were asked to participate in the study (as shown in Appendix I, II & III)

In terms of research instruments, the researcher opted for the observation schedule, semi-structured interview, document analysis and questionnaires as recommended by Potter (2002). He recommended these instruments among others in order to indicate that not only the literature should be used for data collection, but also these instruments should be used. According to Creswell (1998) data collection is a series of interrelated activities aimed at gathering

good information to answer emerging research questions. These instruments were found to be useful in this study as were multiple methods for triangulation that also allow for the prevention of personal bias (Denzin & Lincoln, 2003b).

In terms of data analysis**,** units of meaning were selected as indicated by De Vos, Strydom, Fouche and Delport (1998). Concepts were grouped, related and categorised as highlighted in the study by Rice and Ezzy (2000). Themes that emerged were then identified and recontextualised by referring to the literature taken from De Vos *et al* (1998). Findings for this study were guided by AT and constructivism with elements of TLT as the frames.

In terms of limitations, the researcher wanted to involve all the universities in South Africa. Unfortunately, most of them were not interested and only four of them came on board. Hence generalisation of findings across all higher education institutions is not possible from a case study. Generalisation is not the intention of this study because it is not suitable for case studies (Johnson, 1995). Rather this study attempts to illuminate the issues that need to be conceptualised when designing Web-Based Teaching and Learning (WBTL) environments. Another limitation is that the different higher education institutions may have varying capacity in terms of designing WBTL environments – both in terms of technology and human capacity. Therefore generalisation is not intended. Rather the issues emerging from the case studies will be more useful to inform a context of varying capacity for implementing WBTL.

Another limitation is that there are few university facilitators in each university who use the Web in teaching and learning. This poses a problem in selecting other appropriate methodologies – hence a case study using convenience and snowball sampling techniques were deemed most appropriate for this study.

## 1.7 CONCLUSION

In conclusion, it is within these contextual considerations that this study attempts to map out the philosophical and theoretical parameters (principles) against which the design of Educational Technology Web-Based teaching and Learning (WBTL) is evaluated within South African Higher Education Institutions.

Chapter 1 presented the scope of the study in order to give the readers an overview of the research conducted. It has stated the three key questions according to the purpose of the study. Recent literature and theoretical framework have been highlighted for the readers to read before they read the details in chapter two of the literature review and theoretical framework. Research approach and research methods are summarised for chapter three.

Therefore, the scheme of the next chapters is as follows:
The study consists of the following six chapters:
***Chapter 2:*** Literature review and theoretical framework of this study.
***Chapter 3:*** Research methodology.
***Chapter 4:*** Presents findings of the study. The findings are interpreted and presented from the data obtained through the research instruments.
***Chapter 5:*** Presents a detailed discussion of the findings under the key findings, framework of the Activity Theory (AT) and social constructivism
***Chapter 6:*** Presents conclusion, recommendations and suggested solutions for the study.

# CHAPTER 2
# LITERATURE REVIEW

## 2.1 INTRODUCTION

> "The explosion of the Internet during the 1990s provided a compelling new vehicle for colleges and universities to extend the reach of the institution and introduce dynamic new teaching and learning environments. [WBTL] defined as instruction delivered at a distance over the World Wide Web, primarily for credited-based courses and programs leading to certifications and degrees has achieved strong growth in a short time. Eduventures analysis indicates that more than 350 000 students were enrolled in fully [WBTL] in 2001 – 2002, a figure growing more than 40 percent annually" (Newman 2003, p.2).

Since 1990, the time in which Tim Berners-Lee invented the World Wide Web (WWW) or Web technology (1991), Tim Berners-Lee's invention has become one of the fastest education and training resources (Allen, 2008). South Africa, with regard to the number of internet users in 2007 was 5.1 million (10.3 %) out of 49.7 million population. The growth rate of Web users since 2000 is about 50 % (annually) (Internet World stats, 2007). According to Goldstuck (2008), the number of Internet users in South Africa in 2008 was 4.6 million people for 2008 year-end. This corresponds to a penetration rate of 10.5% based on an estimated South Africa population of 43.8 million (Table 2.1). This growth rate is phenomenal and it raises important questions: What are the reasons for such an increase in usage? How has education capitalised on Web usage?

**Table 2.1**: South African Internet Usage and Population Statistics:

| Year | Users | Population | % Penetration | Usage Source |
|---|---|---|---|---|
| 2000 | 2,400,000 | 43,690,000 | 5.5 % | ITU |
| 2001 | 2,750,000 | 44,409,700 | 6.2 % | IWS |
| 2002 | 3,100,000 | 45,129,400 | 6.8 % | ITU |
| 2003 | 3,283,000 | 45,919,200 | 7.1 % | Wide World Worx |
| 2004 | 3,523,000 | 47,556,900 | 7.4 % | World Worx |
| 2005 | 3,600,000 | 48,861,805 | 7.4 % | World Worx |
| 2008 | 4,590,000 | 43,786,115 | 10.5 % | .W.W |

43,786,115 South African population for 2008 (according to Census Bureau 2009)

In recent years (2000 – 2008), the use of the Web as part of the curriculum across different disciplines and researchers at higher education institutions has increased as predicted (Wilborn, 1999). Harmon and Jones (1999) identify two out of the five ways of using the Web in teaching and learning, namely: first, for informational and second, for supplemental functions. Informational usage refers to the situation where the Web is used to access information (including course template, course notes, resources, learning guides, assignments and the like). The Web is sometimes used to supplement teaching (supplemental) settings as an essential communication tool for learning in order to promote deeper learning.

The different uses as identified by Harmon and Jones (1999) perhaps explain the trend towards an increase in Web usage noted. It is against this background that this chapter reviews literature that influences Web-Based Teaching and Learning (WBTL). Furthermore presents the literature in terms of Educational Technology, Web facilitators' frames of reference; object (Web-Based Teaching and learning environment) with Web learning tools; studies on Web for teaching and learning; Web learning community; the researcher's reflections, as well as the theoretical framework for the study. The term used to put all these issues together as one issue is called Web-Based Teaching and Learning (WBTL) or Web learning.

The literature review is presented within the constructs of Activity Theory (AT), which, as discussed earlier, is the theoretical model adopted in this study.

Briefly, AT according to Waite (2005), is a theory that provides a descriptive framework for the Human Computer Interaction (HCI) professional through which they can better understand and classify the cognitive, physical and social processes involved in performing a specific task, and how those tasks can be related to a larger motivating activity. Myers (1998) defines HCI as a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them. A more detailed account of this theory (AT) and its links to this study are presented in later sections of this dissertation.

## 2.2 EDUCATIONAL TECHNOLOGY

For Kumar (1997) Educational Technology (ET) involves the use of technology to educate or train for purposes of knowledge development and application. This form of education and learning started as an Instructional Systems Design (ISD). At origin it was used by the United States military to train a large number of people during the World War II. As a result of this usage Americans commonly use the term Instructional Technology which arises from ISD produced Educational Technology (ET). Evens and Nation (2000, p.8) see Educational Technology (ET) as “the broad understanding of how to use a particular tool for educational purposes.” It can be understood in terms of involving human and social development as a backbone on any educational process. According to Laurillard (2002), Instructional Technology emphasises the concept of Learning Technologies, as one of its main areas but it is not a term that can be used to define ET because ET is much broader than Learning Technologies (which dominate Instructional Technology). Learning Technologies is just one of the sub areas of ET as the focus of it is only on learning. ET focus on both teaching and learning.

Traditionally, Educational Technology (ET) was defined as the use of Technology in Education (TIE) and Technology of Education (TOE) in order to improve learning and teaching situations. This indicates that ET is divided into two main divisions, namely: TIE and TOE (Percival & Ellington, 1988).

While TIE refers to the various technologies that are available to support teaching and learning, TOE refers to theoretical structures that facilitates teaching and learning. TIE on one hand is divided into two main divisions, namely: Hardware and Software (Percival & Ellington, 1988). The former refers to tools that can be used for education and training and the latter refers to any material that can be used in conjunction with the tools to educate. Some of the examples of the hardware are computer, over-head projector, digital video diskette (DVD) machine and many others. Some of the examples of the software are computer DVD, transparencies, video DVDs and many others. Software carries information to be used in order to educate, train or learn. Both these TIE components can be seen and touched. On the other hand some examples of the TOE are research findings on how teaching and learning can be enhanced, teaching and learning theories (e.g constructivist approach to teaching and learning). This means TOE has a direct bearing on enhancing teaching and learning theoretically.

While TIE and TOE traditionally define what ET is all about, the latter has now evolved substantially. Legendre (2000) sees ET as a field of education that is dominated by planning, designing, implementation and evaluation of TIE and TOE in order to improve teaching and learning situations. ET has been critiqued for lack of theoretical grounds in most of the research projects produced in the field (Knowlton, Knowlton & Davis, 2000). This study thus brings into question different approaches of teaching or theories of learning that have been dominating the design of the Web.

Systems approach and the three schools of thought concerning learning as a cognitive process (behaviourism, cognitivism and constructivism) have been influencing ET (Laurillard, 1993 & Kumar, 1997). This aspect is taken further in the next section that discusses the ‘object’ component of Activity Theory (AT). The reason the system approach has been dominating within the ISD components is that it has been using its main powerful components in teaching and learning. These components are: analysis, design, development, implementation and evaluation (Monahan, 2005). Today these components form part of ET definition.

The design of Web learning has progressively been changing between and amongst behaviourism, cognitivism and constructivism. Sometimes constructivism would be the initial theory that gets reversed to cognitivism and then behaviourism. Within this instability, if any one of TIE and TOE is not being applied and controlled effectively, it is unlikely that Web learning can achieve the intended outcomes. The researcher believes that effective use of both the TIE and TOE in designing the Web (Web technologies) goes a long way unchallenged because TIE has been dominating the field but TOE is attempting to occupy equal status as the TIE. Romiszowski (2004) claims that a successful WBTL environment has 20% technique and 80% tactics.

Figure 2.1**:** ***The Tree Three Rings (TTTR)***

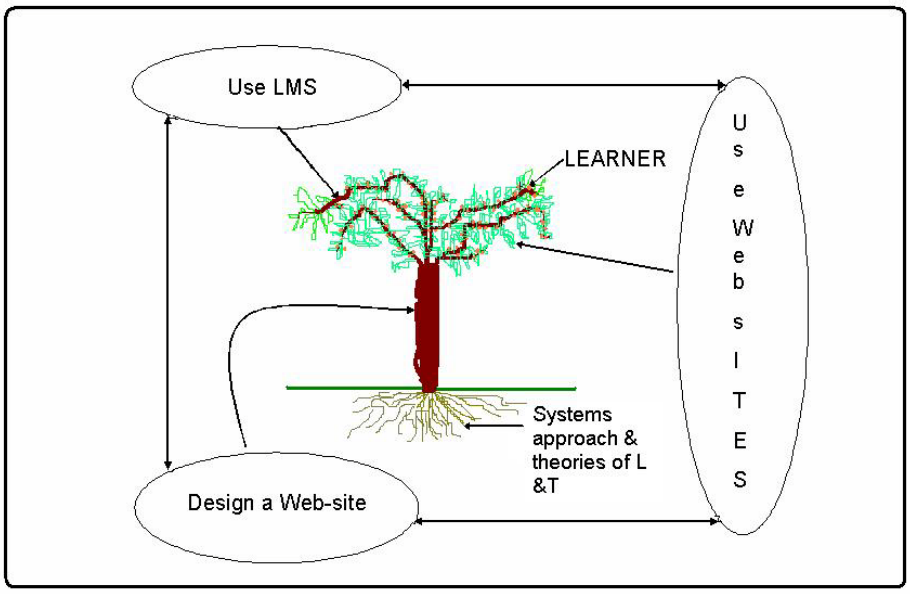



Figure 2.1: The Tree Three Rings (TTTR) can also be used to categorise the main elements of ET, although it was initially designed to simplify how the researcher sees WBTL. TTTR is a theory that was built from the data for this study (see Chapter 6 for details). With the context of ET, the stem and branches (Designing a Web site and LMS) of the tree can be considered as the Hardware (tools) of TIE. Leaves (search engines or web-site) can be considered as the Software component of TIE. All of these form parts that one can see and touch. On the other hand roots (systems approach and theories of learning & teaching)

can be considered as the TOE. The researcher finds this Figure 2.1 to be one of the most effective ways of explaining and understanding the whole concept of ET and the design of the Web (technologies) to facilitate learning.

Educational Technologists thus far have been using the TIE as the main focus of ET, without understanding how the TIE is influenced by the TOE. This dissertation thus attempts to initiate or contribute to the discourse concerning ways in which TOE can influence ET, beginning from Educational Technologists' teaching about the hardware and software (technologies). Instead of using them to educate or train only, it is important to understand how they are constructed in order to understand their limitations before plans can be made for their use. Educational Technologists furthermore, need to look at designing the hardware and software to meet educational needs, not just accepting hardware and software designed for other needs. In most cases these hardware and software are not constructed for education and training in general. For example, ISD and the Internet, both have been dominating the field of Educational Technology for quite sometime and they are still dominating, were constructed for military purposes (Shelly, Cashman, Waggoner & Waggoner, 2001). In other cases, where facilitators (Educational Technologists) have limited knowledge of such technologies, the option is to opt for the second best technology. Among the frames of reference mentioned by White and Weight (2000), one can see that the area of learning about technologies, before one learns about using them to educate or train, is necessary. Today Educational Technology facilitators can hardly operate effectively without this area of learning and about knowledge of these technologies.

## 2.3 WEB FACILITATORS

The term 'facilitator' (Web facilitator) in this study is used to identify a person who is in charge of the Web designed for learning and teaching (i.e. instructor, teacher, educator, lecturer, trainer or academic). However, there are many other names used for this position, such as instructor, teacher, educator, lecturer, trainer, academic, programme director or learning director. The literature on Web facilitators suggests some important personal qualities (these

form facilitators' frames of reference) that must be in place to enhance web learning design. These qualities are summarised in the next section.

### 2.3.1 Web facilitators' personal qualities

According to White and Weight (2000) and White (1999), Web facilitators should have the following personal qualities: knowledge, skills, technologies and facilitating experience (as the frames of reference) in order to be successful in educating students using the Web in learning or teaching.

#### 2.3.1.1 Knowledge of Self (personal qualities) (White & Weight, 2000)

To be clear about students' different experiences is important for the Web learning facilitator for constructivism because constructivism appreciates the use of students' experience. Students' experiences lead to different interpretations and as a result of this quality, they consider a variety of solutions to problems and help their students to contextualise and evaluate critically their answers by reflecting upon them.

Accepting others and holding them with unconditional regard facilitates the interaction among the Web learning community. The facilitators of Web learning use different types of communication in order to facilitate learning through different methods of teaching and learning (Salmon, 2003). If facilitators do not have this quality, they tend to lose many students, because this quality leads to effective communication on Web learning. This in turn promotes a good Web learning environment that ultimately attracts many students.

Authenticity, congruence and honesty are very important for the Web learning facilitators because they attract many students who end up believing in their facilitators (White, 1999). This quality encourages the students to participate as they feel they are a part and parcel of Web learning (White, 1999). Caring and compassion help the Web facilitators to feel what their students feel or experience. Charisma helps the Web facilitators to know how or when it is appropriate for them to say something or not to say anything.

It is for these reasons that conceptual with systematic thinking enables the Web facilitators to put everything together logically when they design Web learning environment. This is because concern for quality helps Web facilitators to describe the quality as it is based on the context within which they are working.

Empathy gives them the ability to see the situation as the other sees it, and flexibility with versatility in the process allows them to switch gears at last moments. An inspirational attitude helps the Web facilitators with the ability to motivate students to work as active students, not as passive students. Neutrality of opinion will assist the Web facilitators by not having a vested interest in one solution over the other.

Being open to self-growth, furthermore, helps the Web facilitators because they become reflective and critical thinkers. Moreover, self knowledge and awareness help the Web facilitators because they are able to discuss and critique their strengths and weaknesses so that they do not affect others. A sense of when to remain silent helps them to read the situation before they respond, either verbally or otherwise.

According to White and Weight (2000), the Web learning facilitators should have almost all the above qualities in order to work effectively as facilitators.

### 2.3.2 Web facilitators' experience, knowledge and skills

For effectiveness in Web-Based Teaching and Learning (WBTL), the literature on facilitators suggests that the following knowledge and skills are crucial in designing Web learning (White, 1999).

#### 2.3.2.1 Knowledge Base (knows/skilled in...) (White & Weight, 2000)

- Adult learning principles: involves theories like Transformative Learning Theory and many other pedagogical issues;
- Communication styles: involves any interaction between facilitators and students or students with other students;
- Learning styles: involves the three schools of thought (behaviourism, cognitivism and constructivism) among other things;

- Cultural competency: involve the way the Web learning groups interact;
- Group and interpersonal dynamics: involves how the Web groups interpret and communicate their issues;
- Group facilitation: involves the management of the Web learning so that learning can take place;
- Knowledge of assessment of audience: involves the way in which the Web facilitators understand the Web community;
- Subject and content matter expertise: involves the way in which the Web facilitators understand their subject areas in terms of teaching and learning and;
- Teaching and training: involves the way in which the Web facilitators educate their students.

#### 2.3.2.2 Facilitation Skills (White and Weight, 2000)

- Active or effective listener: involves a good understanding of theories that deal with active students;
- Encouraging open communication: involves the ways in which facilitators encourage students to participate by contributing when learning is taking place;
- Feedback skills: involves methods used by the Web facilitators to give feedback to their students;
- Being attentive to when participants are or aren't "walking the talk": involves the ways in which the Web facilitators read and understand their students;
- Questioning (as opposed to telling) skills: involves asking questions that will lead to insight, asking provocative questions, using problems or questions, tools and other means to stir the mind and body to learn. Students need not be provided with answers;
- Clarify experiences for additional insights: involves the use of students experiences to help them to learn new information;

- Create or nurture constructive conflict or "creative abrasion": involves creating a situation that will help one's students to transform from being passive to become active students;
- Focus -- keeping the discussion on track: involves using methods that help students to have a direction on how to achieve the outcomes;
- Listening from a non-judgmental place: involves listening to students from a neutral position in order to judge them guided by the context from which they are coming;
- Listen for understanding and context: involves listening with a good understanding of students' culture;
- Maximise gaining of knowledge and skill in the time available by controlling students' interaction during the process of learning to avoid unnecessary time wasted;
- Observation skills: involves noticing patterns in group interaction and bringing it up to the group for exploration. Notice what is NOT said and what is said, as well as observe and listen for opportunities and actualities of learning;
- Pacing skills --change the level of the discussion at the appropriate time from brainstorming to evaluation to decision to action planning, or from thinking to feeling;
- Presentation skill: involves the use of different methods of presentation and the tools (including low and high technology such as over-head projector and computer presentation software);
- Problem solving: involves managing the conflict and other related problems of Web learning;
- Ability to extract positive outcomes from difficult situations: involves working with different levels of outcomes (critical outcomes, learning area outcomes and lesson / specific outcomes);
- Ability to read not only individuals, but also interaction between individuals, and the subtleties of the group;
- Resume or restart groups: involves working and motivating Web learning groups of students;
- Steer group in a positive direction: involves division of labour and guiding students to achieve the outcomes;

- Summarisation skills: involves succinct, accurate and non-judgmental summaries;
- At appropriate times use out-going participants to get the discussion rolling *and* encourage the quiet ones and;
- Writing skills: involves using computer software to type and format documents.

#### 2.3.2.3 Technology Skills (Carliner, 2000)

- Electronic mail (Email);
- Email list software (i.e. "listservs");
- Threaded discussion tools where facilitators and students exchange documents for group discussion purposes;
- Linear discussion tools where certain facilitators or students exchange documents with certain individuals not in a group form;
- Instant Messaging (IM) tools;
- Chat tools [Internet Relay Chat (IRC), java, voice];
- Hypertext Markup Language (HTML);
- Web page publishing;
- File Transfer Protocol (FTP) and;
- Group discussion tools: involve software that can also read the email.

If facilitators are using all tools, it indicates that they are operating at the third level of AT (Engestrom, Miettenin & Punamaki, 1999)and use the rings of 'The Tree Three Rings' effectively (see Figure 2.1 above).

#### 2.3.2.4 Online Interaction Experience (White and Weight, 2000)

- Social online communities: involves facilitators, students, Web technical support members and other Web specialists;
- Chat and live events (synchronous);
- Email lists;
- Virtual teams / virtual workgroups;
- Cross cultural groups involves groups with different interest, but who are all trying to follow one Web learning culture in order to learn and;

- Distance education / training: involves teaching online using Web learning.

The issues bulleted above build facilitators' frames of reference and suggest that when the facilitators are involved in WBTL, they should assume a role of becoming constructivists as they are promoting the learner-centred approach (Herrington, Reeves & Oliver, 2004). Anderson and Elloumi (2004) emphasises that facilitators can not run away from using the strength of the other two schools of thought (behaviourism and cognitivism), even if they are using the constructivist approach. It is therefore expedient that a certain portion of WBTL is better served by the two schools of thought. If facilitators consider only the above issues in their WBTL, they may deny themselves an opportunity to develop other important issues that are important in terms of building the frames of reference for the other two schools of thought as discussed in the next section of Web objects.

Cummings and Bonk (2002) recommended the use of the scaffolding method in using WBTL. Cummings and Bonk (2002) conducted an online survey to determine a most successful online learning method. They found that the most scaled and successful online courses used the scaffolding method. Roblyer and Edwards (2000) define scaffolding as a way of gradually moving from short-term needs to longer term needs (from behaviourism to constructivist approach). Laurillard (2002, p.77) argues that constructivism "has focused more on the [facilitator-student] interaction but without a detailed link between [facilitating, learner activities] and interaction with the subject." This implies that constructivism cannot go unchallenged. This study hopes to open the discourse with the aim of trying to establish what should be done in order to achieve WBTL with relevant learning theories.

Most studies on WBTL have been involving facilitators' frames of reference. As a result Taylor (1998) believes that too much emphasis has been placed on the role of the facilitator at the expense of the role of the student. Although it is difficult for learning to occur without the facilitator playing a key role, students also have a responsibility for creating the learning environment. As part of a community of knowers, students share the responsibility for constructing and

creating the conditions under which learning can occur. Thus the main aim has to be about transforming the role of the student from information receiver to navigator, active student, information interpreter, and implementer of knowledge.

## 2.4 OBJECTS WITHIN WBTL ENVIRONMENTS

As a process that involves both students and facilitators, Web Learning is defined as a structured event that is specifically intended to enhance knowledge and skills. It is an engagement that is intentional because it begins with certain outcomes and students are assessed by the extent to which they achieve such outcomes (Carliner, 2000). It is thus the purpose of the next section to discuss the Web systems approach and learning and / or teaching theories.

### 2.4.1 The systems approach to Web learning design and development

The Web systems approach with seven steps, as outlined by Zelkind (2005a), plays an important role in designing the Web for learning. It is treated as if it is enough to have it as an independent approach in designing any Web for learning purposes. The seven steps are: Defining learning goals for the course; Relating lesson and learning performance objectives to the course learning goals; Designing relevant assessment strategies; Providing feedback strategy; Selecting relevant teaching / learning strategies; Constructing and / or selecting student involvement activities; and Selecting relevant learning resources. Zelkind (2005b) further grouped the seven steps into two main categories: the first category (steps 1 to 4) is planning a course based on the outcomes to be achieved as a result of the course. The second category (steps 5 to 7) is about the integration of tools (technologies) into one's learning activities.

This further categorisation, however, indicated that the systems approach does not include other important elements such as implementation of the course and revision or refining of the course. Howard and Terry (1997) argue systems approach is not complete without the instructional design principles that bring

about implementation and revision of the course. Another problem of the systems approach is that it has been dominated by behaviourism principles. If the Web facilitators can use it without considering the main learning theories that they want to use for their students' learning, it may work against other learning theories (constructivism can be one of them).

There is thus a need to use the seven steps only to form the planning stage. This stage needs to be followed by the implementation stage, evaluation and revision or refining stages. Romiszowski (2004) argues that systems approach leads to more effective and consistent WBTL environment because it ensures that all involved are well trained, oriented, motivated and managed to ensure full cooperation at all times. While these stages of the systems approach are being followed, one needs to keep instructional design principles or learning theories in mind, as discussed below.

### 2.4.2. Web Learning Theories (schools of thought)

Web-based teaching and learning theories should be taken into consideration at all times because of the influences they have in designing and managing the Web in teaching and learning (Cummings & Bonk, 2002). For instance, if facilitators wish to promote higher order thinking on Web learning, they can give students some challenging tasks that enable students to link new information to old, acquire meaningful knowledge, and use their meta-cognitive abilities. Bonk and Reynolds (1997) believe that it is the instructional strategies (theories) and not the technologies that influence the quality of learning, or that improve quality of learning.

Reeves, Herrington and Oliver (2002) believe that a well designed course with sound theories determines the quality and effectiveness of learning (not the tools). This means that no matter how advanced the tools used in Web learning are, if theories are not a part of that design, it is not guaranteed that learning will ever take place.

Literature suggests for instance, that there are three main learning theories (schools of thought) that need to be taken into consideration when designing

any Web learning (Anderson & Elloumi, 2004). The theories are behaviourism, cognitivism and constructivism. The next three sections discuss these theories respectively.

### 2.4.2.1 Behaviourists

In terms of behaviourists thinking, teaching has to involve presentation of factual knowledge. The theory is based on the idea that if one has to teach students, one must teach facts. This thinking comes out of a belief that there are facts (truth) somewhere that need to be collected by instructors (facilitators) and presented to their students. In turn, students are expected to take such facts exactly as they are from their facilitators without questioning and / or interrogating them. Facilitators first start their lessons by defining their students' characteristics. They go on to set certain behavioural changes (outcomes or objectives) that are expected after each lesson. According to Good and Brophy (1990), such behaviour can be observed and measured as indicators for learning. If facts exist somewhere, facilitators need to use certain defined rules or procedures to discover and collect them for their students. In this process students are expected to be passive by adapting to their learning environment.

The main thrust in behaviourist thinking is that of expecting students to memorise facts and reproduce them if they are tested. According to Anderson and Elloumi (2004), there are four implications for [Web] learning that need to be considered:

- "Students should be told the explicit outcomes of the learning so that they can set expectations and can judge for themselves whether or not they have achieved the outcome of the [web] lesson;
- Students must be tested to determine whether or not they have achieved the learning outcome. [Web] testing or other forms of testing and assessment should be integrated into the learning sequence to check the student's achievement level and to provide appropriate feedback;
- Learning materials must be sequenced appropriately to promote learning. The sequencing could take the form of simple to complex, known to unknown, and knowledge to application and;

- Students must be provided with feedback so that they can monitor how they are doing and take corrective action if required." (Anderson and Elloumi, 2004, p.8).

Fosnot (1996) explains behaviourism as an epistemology that focuses on intelligence, domains of objectives, levels of knowledge, and reinforcement. It is then clear that if facilitators have to use this theory alone, there is a danger that they may end up promoting passivity on the part of students. In most cases passive students are not creative and / or active, but they can only reproduce what was given to them by the facilitators.

Lavagnino (2006) believes that there are some key issues that need to be considered in order for the application of behaviourism as a part of Web learning to be meaningful. Such key issues range from:

- 'How learning takes place?
- Which factors influence learning?
- What is the role of memory?
- How does transfer occur?
- What types of learning are best explained by this theory?
- What principles of this theory are relevant to instructional design?
- How should instruction be structured to facilitate learning?
- How should learning be evaluated? and
- What are the strengths of behaviourism and the criticisms of behaviourism?

Learning takes place when the facilitators have identified certain objectives or outcomes that they are able to measure or observe in terms of students' observable performance. If there is a measurable change in terms of students' behaviour, then facilitators assume that learning has takan place. Lavagnino (2006) defines learning as a "gradual strengthening of the learned relationship between clue and [behaviour] driven by a pattern of consequences (reinforcement)" ://web.cocc.edu/cbuell/theories/behaviorism.. Drilling lessons can link the two (clue and behaviour) in such a way that the time between them is unnoticeable.

In order to condition their students, facilitators need to prepare a good environment. This may range from resources that may yield the results (outcomes or objectives) that are expected after using those resources to introduce a conditioning environment for students. Research (Wilhelmsen, Inge Asmul & Meistad; 1998), shows that students are responding to challenges of the environment. Although the mind is not the main issue according to this theory, conditioning and drilling students within the environment cause their minds to be affected. To put it differently, students can use their minds in learning, although the mind is not a focus of the instructions in this theory. Students can achieve this by practising habits that can help them to be ready to respond to any environmental challenge.

Students can only apply what they have learned in a new situation if they can recognise a similar recognisable situation. That is why drilling lessons, practising and repetition sessions are important. In order to facilitate Web learning, Lavagnino (2006) goes on and adds that the structure of any instruction should be as follows:

> "First, a task analysis should be undertaken in order to determine the behavioural changes needed to accomplish the task. Then, the instructor should prescribe a sequence of learning events which will enable the student to reach the goal. When the goal or target is presented, then opportunities are made available to allow the student to practice making the proper desired response. Instructional cues assist the student in making the proper response, and reinforcement strengthens the correct response. Evaluation should be based on a predetermined set of criteria. Every student engaged in this learning exercise should be evaluated based upon the same set of criteria" ://web.cocc.edu/cbuell/theories/behaviorism..

Judging from the above statements, it is clear that behaviourism presents everything first before the process of learning begins. This makes it easier for

students to follow and master what is presented within a short period of time. This is because they do not have to search for information (as it is given to them). Instead, they only need time to practice it until they master it so that they can reproduce it if it is necessary to do so. Behaviourism also treats learning as a system that can start and end after students' observable behaviours have changed and been measured. It cannot be effective in teaching students for life long learning because it does not treat learning as a process. However, it can be very effective in presenting facts required to form a certain background for a certain challenging lesson and also for introductory purposes into a specific area of knowledge (Anderson & Elloumi, 2004).

It is a given fact that everywhere in any teaching environment facilitators should give a certain instruction depending on the nature of that teaching. Any instruction that is given by the facilitators becomes an element of behaviourism because the facilitators give the students what the facilitators think and believe is right or good for the students. In the context of this study, the researcher strongly believes that even if the facilitators try to avoid giving their students an instruction by telling them to go to the Internet to look for information, the facilitators have indirectly started to teach their students by giving them the instruction. Instruction is always there, even if the facilitators may deny it.

Mahoney (2005) emphasises the fact that although his approach in designing any Web learning is more on the constructivism paradigm, he still includes certain elements of the behaviourist paradigm. He still uses some parts of behaviourism because of its emphasis on agency and the activity of the organism; its emphasis on contrast and directionality; its emphasis on the wisdom of working with small steps in the direction of desired change; as well as its emphasis on accountability and the evidence of experience.

For Mahoney (2005), behaviourism can't work alone successfully because it attempts to press associationism more than warranted. He argues that the behaviourist tendency to either deny cognitive processes or to redefine them as relatively simple connections between presumably isolated events (whether defined as "stimuli," "responses," or whatever); can ensure that a pattern (habit)

is eliminated from a person's repertoire. He also expresses concern about behaviourism's authoritarian and dogmatic tendencies that deny the meaningfulness or warrant for knowledge claims that fall outside of a positivist (or logical positivist) approach to epistemology (Mahoney, 2005).

In order to control the kind of instruction given to students, the facilitators need to first understand the important elements of cognitive theory (discussed below) in order to understand what behaviourism has to offer. By understanding the cognitive part of their teaching environment, facilitators will be in a better position to answer the 'how' question of their teaching (after they have answered the 'what' part of their teaching using the behaviourism theory) (Ertmer & Newby, 1993).

#### 2.4.2.2 Cognitivism in WBTL

Contrary to behaviourism, cognitivists believe that if one has to teach students, one must take the students' internal processing (mind) into consideration. While the first theory (behaviourism) considers external factors only (behaviour), cognitivism consider the internal factor (mind). In order to explain the learning process, cognitivists divide students' mind into sensory store, short-term memory and long-term memory. The three divisions work through the internal processes that involve thinking, motivation, reflection and other considerable factors of mind processing. According to Kalat (2002), if a piece of information received through senses into the sensory store is not processed after one second, such information gets lost. Information from short-term memory on the other hand, should be processed properly within a period of twenty seconds in order to be transferred into the long-term memory, otherwise it cannot be transferred.

Cognitivism is based on what a student knows rather than what a student can do, and this is different to behaviourist thinking. This happens when students are given a series of activities they can do to achieve defined goals within a particular lesson. Positive feedback and student support are very important because they guide students in the process of creating accurate mental symbols that are necessary during the process of transferring information from

one memory to the next (short to long-term memories). If students lack those mental symbols it becomes difficult for them to enter this process. Lavagnino (2006) believes that activities for this theory should involve reasoning, problem solving, information processing and other complex processes of learning.

Given these observations, cognitivism indicates how students process any given information. It indicates how much information a student can process and how such information can be stored and processed. It is on these bases that the researcher agrees with Ertmer and Newby (1993) that cognitivism should be used for the 'how' part of the WBTL (that is to teach principles and processes). For the facilitators to understand and be in a better position to answer the 'why' part of their teaching however, they should first understand the constructivism theory.

**2.4.2.3 Constructivism in WBTL**

Specific shortcomings in both behaviourism and cognitivism enabled further thinking about constructivism learning process. Constructivists believe that facts only exist within a contextual theoretical framework. For this theory, knowledge is not coming from outside students' mind, but students use their interpretation or explanation of something presented to them to create knowledge. They use their experience to construct knowledge, not from the facilitator's instruction. Fosnot (1996) explains constructivism as a teaching practice and as an epistemology which assumes that students construct their own knowledge on the basis of interaction with their environment. He also identifies four epistemological assumptions that are at the heart of constructivist learning, namely: firstly, knowledge is physically constructed by students who are involved in active learning; secondly, knowledge is symbolically constructed by students who are making their own representations of action; thirdly, knowledge is socially constructed by students who convey their meanings to others; and fourthly or lastly, knowledge is theoretically constructed by students who try to explain things they do not completely understand.

There are many overlapping factors between these theories. This is the reason Ertmer and Newby (1993) believe that these theories should be used as

taxonomy for learning. There are three conditions to be met though before they are used this way. Firstly, one needs to use behaviourism to introduce one's lesson by presenting the facts (the 'what' part of learning). Secondly, one needs to use cognitivism to measure whatever is presented on Web learning into chunks that can possibly be processed by students (the 'how' part of learning). Thirdly, one needs to use constructivism to challenge students in order to develop higher order thinking by giving them projects / tasks / activities from the constructivists' point of view (the 'why' part of learning). To change from being behaviourist to cognitivist, and then constructivist, is something that facilitators of the Web learning cannot easily avoid as Mahoney (2005) writes:

> "How have I changed in my more than 30 years of work in the profession of psychology? I have been a behaviorist, a cognitivist, and (currently) a constructivist. Cutting across my involvement in these traditions have been my interests in (1) basic human change processes; (2) history and systems of ideas and practices, (3) self-relationships (including control, esteem, and perception; (4) issues and experiences of embodiment, exercise, and sport psychology; and (5) science and complexity studies…."
>
> ://www.constructivism123. .

Goldfried (2000), underwent a similar experience to that of Mohoney (2005). It is clear from his experience that Web facilitators tend to transform from being behaviourists to cognitivists and then constructivists. However, working as constructivists does not make them ignore the strengths of behaviourism and / or cognitivism.

Oliver and Herrington (2001) call the three schools the instructional forms, and see behaviourism as used for initial knowledge (level one); cognitivism for advanced knowledge (level two), and constructivism for expertise knowledge (level 3). Initial knowledge involves instructions from the facilitators that can help students to develop initial knowledge. The instructions may include facts, rules and procedures for the course. Advanced knowledge involves higher level of knowledge where students start to understand the concept, the development and the principles. The course starts to be less structured and more student-

centred. Expertise knowledge involves the period when the students are able to analyse, synthesise and use alternative perspectives. These positions are in line with the three levels of Activity Theory (AT) which is used to frame this study (see next section on theoretical framework). Behaviourism is good for activity level (level one of AT), cognitivism is good for action level (level two of the AT), and constructivism is good for operation level (level three of the AT) (Waite, 2005).

## 2.5 WEB LEARNING TOOLS

### *2.5.1 The Internet*

The term Internet is used in two senses in this dissertation: the first is when it starts with 'lower case i' and the second is when it starts with 'upper case I'. The first one with lower case i' refers to when users connect two or more networks together, "it is sometimes called internetwork or just internet" (Shelly, Cashman, Waggoner & Waggoner, 2001, p.7.2). But for this study it refers to intranet as the term used in South Africa for different organisations. The second one with upper case 'I' refers to a collection of networked computers all over the world. This one refers to the world wide connection or Wide Area Network (WAN). However, this definition seems to exclude the wireless Internet connections. According to Eugene and Provenzo (1999, p.13) "the Internet is a collection of millions of linked computers". The latter seems to accommodate both types of the Internet connections.

In the early stages (before the Internet) there were bulletin boards but, according to Shelly *et al* (2001, p. 7.3), the Internet started to work at the "University of California in Los Angeles, the University of California in Santa Barbara, the University of Utah and the Stanford Research Institute." They started by linking four computers in 1969, although the initial work was founded by an agency of the U.S Department of Defence called the Advanced Research Projects Agency (ARPA). The first network was called ARPANET and one of the aims of this network was to create a way for scientists to share information and collaborate on military and scientific projects at different locations. After this period the Internet's popularity spread such that many other countries became

interested and bought into the idea of the Internet (Houweling, 2002). Today, more than 20 billion computers distribute information over the Internet. To see the correct number of Internet or Web users one needs to visit the Internet World Stats at .internetworldstats.. There are many service providers that help institutions to connect to the Web.

As a system that works like a postal service, the Internet relies on an addressing system in order to send data to its destination. The Internet starts with http, which stands for Hypertext Transfer / Transport Protocol.

## 2.5.2 Studies on WBTL

### 2.5.2.1 WBTL Approaches

Salmon's (2003) action research (results of his study) reveals that WBTL environment consists of five stages, namely:

Stage 1: (Access and motivation) at this stage facilitators set up a computer system for students to access information. This is also the stage that facilitators welcome and encourage students to participate using Web tools or technologies (e.g. chat and discussion tools);

Stage 2: (Online socialisation) at this stage facilitators and students send and receive messages. They also familiarise and provide bridges between culture, social and learning environment;

Stage 3: (Information exchange) at this stage students search and personalise software. Facilitators facilitate tasks and support students in using learning materials;

Stage 4: (Knowledge construction) at this stage facilitators and students use conferencing Web tools (e.g. chat and discussion tools). Facilitators facilitate the process of constructing knowledge and;

Stage 5: (Development) at this stage facilitators and students provide links outside closed conferences. They are also involved in the process of supporting and responding to each other. At this stage facilitators and students use constructivism (Salmon, 2003).

In terms of Stage 1, the majority of participants felt that was largely behavioural in nature. Participants indicated that the activities that were given by facilitators in the WBTL environment consistently asked for repetition, drill and practice. These responses suggest that the first part (first one-third) of the design of WBTL is largely influenced by behavioural principles.

With regard to stage 2 & 3, the majority of participants felt that stages 2 and 3 were largely of cultural and social constructivism in nature. Participants indicated that the activities were encouraging, bridging social and cultural gaps in constructing knowledge. These responses suggest that the second part (second one-third) of the design of WBTL is of cultural and social constructivism principles.

In relation to stages 4 & 5, the majority of participants felt that stages 4 and 5 were largely communal constructivism, cognitive constructivism and advanced level of Activity Theory (which is driven by the condition) in nature. Participants indicated that at these two stages activities were in the WBTL environment. They were consistently asking for building knowledge in groups, drawing from real situations, promoting individual cognitive skills with reflection and motivating them to use Web technologies to become responsible for their own learning. These responses suggest that the third part (last one-third) of the design of WBTL is of the communal, cognitive constructivism and AT principles.

Solmon's (2003) findings thus suggest that WBTL has three schools of thought as emphasised by Oliver and Herrington (2001): behaviourism is used for initial knowledge; cognitivism for advanced knowledge and constructivism for expertise knowledge. It also suggests that it has the three levels of AT, as explained in the next section of theory in this chapter. However, these findings are silent on other important types of constructivism such as radical constructivism, which does not deny any objective reality, but challenges the way in which such reality is claimed; and critical constructivism, which emphasises the re-formation of these social and cultural issues of the environment in order to improve the use of constructivism as a frame of reference in designing WBTL environment (Von Glasersfeld, 1990).

Muwanga-Zake (2004) found that WBTL games are useful in teaching and learning science subjects because they familiarise learners with advanced web tools (White, 1999) that promote critical thinking and construction of knowledge based on critical evaluation of their experiences. Through test script analysis the majority of students felt that WBTL games are important because they allow students to use their individual pace and to become responsible or take charge of their own learning as they learn almost all the useful tools of the Web (search engines, for instance).

This suggests that if WBTL incorporates games as one of the teaching and learning strategies, it is based on constructivism principles. Biggs (1995) emphasises that constructivism invites learners to explore their own thinking and knowledge building processes. This means one cannot have highly detailed lesson plans, as Littlejohn (2003) argues, if one uses the constructivism principles in a lesson then highly detailed lesson plans become impossible. It becomes impossible in most cases because there are many possibilities in terms of what emerges as a part of the lesson.

Govender (2001) conducted a survey study on Virtual education. He found that Virtual education, or WBTL, can be used as a part of distance education. WBTL works as the alternate system of education in South Africa, because it is popular amongst students between the ages of 18 to 45. The majority of students felt that WBTL is very flexible because it allows for various age groups to study at their leisure and is also far cheaper than studying in face to face contact education.

The researcher finds these results ironic because the same university (which was one of the four institutions) where the study was conducted students had a problem with the introduction of a computer CD to replace the prospectus and their course notes. Students protested and marched against this decision in January 2008. They indicated that not all of them had access to the computer, and felt they were not going to accept the introduction of the computer CD. They thus demanded printed materials only (Ngcobo, 2008). The researcher argues that the majority of these students may not benefit in terms of using

WBTL as the alternate system of education because WBTL is more demanding than accessing computers to read information from the CD. It also demands the Internet access and logon into the university Learning Management System (LMS).

In terms of the cost factor, Bonk (2001) is one of the researchers who indicate that there is no widely agreed method of working out WBTL costs because there is no standard way to measure the educational and other benefits of using the WBTL environment. Therefore, it is still not guaranteed that the WBTL environment is far cheaper than other approaches.

Another important study that one can learn from is the study that was conducted by Prammanee (2003). The study was a case study of perceptions and attitudes of instructors and learners toward interaction in WBTL courses. Through interview and observation Prammanee (2003), found that learners had a high level of satisfaction if the Web learning was driven by content (course notes) as it was easy for them to read on the screen (leaner-interface level according to Hillman, Willis & Gunawardena, 1994). All participants felt that the Web or Internet was a useful tool for them to interact with each other. However, learners with advanced knowledge and skills in using Web technologies complained that the course was too simple and as a consequence of this, they were not gaining anything. Furthermore, he found that learners needed their instructors to introduce the discussion and wrap it up at the end of each topic. They also needed their instructors to lead them step-by-step in their first and second face-to-face meetings.

The results suggest that if the levels of interactions (learner-content, learner-teacher, learner-learner and learner-interface interactions) (Moore, 1989 and Hillman, Willis & Gunawardena, 1994) are not taken into consideration in a WBTL environment, learners with advanced knowledge and skills of using Web technologies tend to feel that they are wasting their time and may decide to leave online courses for face-to-face courses. The results further suggest that learners were given one level of interaction (learner-interface) to experience, which may be boring to those who have advanced skills in using basic Web

technologies. They also indicate that learner-instructor interaction is very important in learners who are using WBTL environment for the first time. According to these results, all levels of interaction should be accommodated in WBTL environments (in terms of activities given to learners).

However, WBTL environment comes with “an entirely new vocabulary, institutional policies and structures, and substantial institutional budgets” (Newman 2003, 2). This situation brings one of the main challenges in terms of using the WBTL environment. This means that facilitators need more time to learn new vocabulary, policies and structures before they think about their module content. According to Bonk (2001) facilitators need a lot of support from their institution in order to help their students. One of the findings from a study conducted by Graham, Cagiltay, Craner, Lim and Duffy (2000) indicated that facilitators felt that managing WBTL was very time consuming. This means that facilitators need more time on WBTL than they do on face-to-face teaching and learning.

Another main challenge is that WBTL has been criticised for not having pedagogical tools for facilitators as revealed by Bonk’s (2001) survey. One of the main findings of this study was that facilitators were in need of pedagogical tools, monitoring, WBTL guideline or advice, experts answers to problems and communities of their WBTL. The facilitators felt that these issues needed to be addressed in order to help them to foster their students’ critical and creative thinking in their WBTL efforts. Kendall (2001) believes that critical thinking is a function of working on WBTL. This means that if students are working on WBTL they automatically develop critical thinking skills and at the same time enhance their learning.

Another major finding from the study conducted by Graham *et al* (2000) was that while the facilitators were well motivated in doing excellent job of teaching using WBTL but they were not always familiar with what strategies would be most successful in their WBTL environments. This suggests that lack of pedagogical tools and time are becoming two of the most challenges faced by lecturers in using WBTL environment.

### 2.5.2.2 WBTL Methods

By means of the literature review, Oliver and Herrington (2001) found that collaboration is one of the powerful methods in WBTL environments as it provides many opportunities for teaching and learning. Collaboration is a situation in which people use the Web in teaching and learning. Learning takes place automatically as a result of their interaction, either intentional or unintentional because other activities are not for learning purposes. Collaboration takes place in a form of a conference where software called Groupware is used to produce either synchronous or asynchronous communication. Zelkind (2005a) define these types of communication as follows

> "Asynchronous communication is communication taking place at different times or over a certain period of time. The term has acquired wide currency in online learning, where exchanges between teachers and students are frequently enacted asynchronously rather than in simultaneous or face-to-face conversations. Synchronous communication is communication taking place at the same time. Synchronous, or real-time, communication has yet to emerge as a popular technology in online education, but the likely merging of Web and audio/video delivery formats over time may, if successful and affordable, effectively virtualize education on a global scale"
> ://www.umuc.edu/virtualteaching/module1/systems.

The findings indicate that when students learn in small WBTL groups, the interactions frequently involve higher order thinking and lead to critical reflection by students (Oliver and Herrington, 2001).

The findings suggest that collaboration tools (asynchronous and synchronous) are very important in WBTL environment if one's intention is to promote deep or durable learning.

> "Deep learning is typified as an intention to understand and seek meaning, leading [learners] to attempt to relate concepts to existing experience, distinguishing between new ideas and existing

knowledge, and critically evaluating and determining key themes and concepts" Eaton (2006) ://cwis.livjm.ac.uk/lid/ltweb/glossary/# .

Knowlton, Knowlton and Davis (2000) use the concept of durable knowledge construction (instead of deep learning), which was identified by Hacker and Niederhauser (2000) as a kind of learning that is facilitated by active collaboration.

Palloff and Pratt (2001) found that knowledge management and performance support are useful in WBTL environment that is tailored to appeal to all learning styles. Knowledge management is an organised database that captures and stores any important information for the students (Palloff & Pratt, 2001). Such information is stored in a special database called a knowledge base or online reference. Learning takes place when students interact with the database. Here learning can be intentional or coincidental. The performance support is a learning environment where a computer is programmed to assist students with specific tasks (Palloff & Pratt, 2001). Learning takes place coincidentally because the main aim of this student's support is about performance and not about knowledge and skills. The software, called an electronic performance support system (EPSS), provides students with the performance support.

This suggests that all WBTL environments should be designed in such a way that they are able to accommodate all different learning styles. Moon and Hawkridge (2003) believe that it is not easy to accommodate all different learning styles without preparing clear assessment criteria first. However, the researcher believes that performance support may end up working as a way of spoon feeding students and promote passive students. In South Africa it may work against the present system of education which emphasises the achievement of different outcomes that are based on knowledge and skills (Asmal, 2003). Lynch (2002) believes that if the tool can perform that task, let it perform it no matter whether or not students gain specific skills.

Other researchers (Galusha, 1997, Cardinali, 2004 and Romiszowski, 2004) believe that WBTL has failed because it started with the concept of 'e-Learning',

then ‘e’ disappeared and left ‘Learning’ alone. These researchers believe that it disappeared because it did not overpower the face-face learning as it was expected (Barron, 1998 and Jones, 2005). They question the failure of the new virtual universities (Cardean University, Virtual temple, Harcourt and UK E-University) that were established for WBTL courses. Romiszowski (2004) identified four elements that needed to be treated equally in order to avoid the failure. The elements are: Electronic or Technology (Web technologies), Learning, Management and Needs (ELMN). He believes that any over-emphasis on one of them at the expense of others is dangerous.

## 2.5.3 Reflection of the researcher on the above issues of WBTL

The researcher believes that WBTL issues can be summarised using the above Figure 2.1: The Tree Three Rings. The three rings are explained as follows:

### 2.5.3.1 Using web sites (search engines) in teaching and learning

This is the easiest of the three rings to use in teaching and learning, because one needs to use search engines to search for relevant information. Search Engines and Web Directories are software programmes that find Web sites, Web pages or Internet files that match one or more keywords that users enter (Mingers, 1999). They are mainly used for both informational and supplemental functions (Harmon & Jones, 1999). Web Directories also include detailed lists of topics on a particular subject. The researcher believes that if they are incorporated into any WBTL they can help students with information and also add more resources to those that are provided by their facilitators.

If facilitators want to use this ring they only need an Internet connection that can help them to visit web pages to navigate. With this minimum requirement facilitators and students can use the web in teaching and learning using the easiest ring of the Internet or Web. Although this is the easiest ring, it also has rules (Eugene & Provenzo, 1999) to be followed when searching for information (e.g. the use of Quotation marks “ “ says a lot in searching for information).

**2.5.3.2 Using Learning Management System (LMS)** (Appendix III)

These are organisations or institutions that are involved with research, design, moderation, teaching, assessment and maintenance of online or Electronic-Learning software. They provide a means to sequence content and create a manageable structure for instructors (facilitators) / administration staff (Siemens, 2004). In short, they create a learning environment (using the web). They create this by producing some software packages. Some of the most popular examples are: .webct., .moodle., .blackboard., .lamsinternational., ://www.sakaiproject.org/index. and the like.

They are divided into two types, namely proprietary and open source. Proprietary was the traditional package which was expensive and did not always meet the facilitator's needs, because it was difficult to customise and it also had a licensing problem (Bos, Munoz & Duzer, 2005). Some examples of this type from the above examples are WEBCT and BLACKBOARD.

Open source is the alternative to proprietary source and in most cases is being used by academics (facilitators) and programmers (technical support) at major universities across the world (Bos *et al*, 2005). Open Source means the software is delivered with the source code and the license agreement gives the licensee the right to modify and redistribute the software (Bos *et al*, 2005). Open sources are more user friendly than the proprietary sources; as a result today almost all these packages claim to be open sources. Then facilitators as the users should compare them before using them by visiting web sites that can help them to compare such as: ://www.edutools.info/course/. Some examples of the open source from the above examples are MOODLE, LAMSINTERNATIONAL and SAKAI. The SAKAI package was produced by an open source consortium for online tools to lower the cost for the users (different institutions).

> "Open source software is free, and the end-user has the freedom to fully customize the software to suit the needs of the institution. Open source software is constantly being refined and tested by the

> community of its users. The flexibility of the open source environment fosters creative collaboration, making this movement [academics and programmers] ideal for use in the higher learning sphere. Schools are using open source solutions to administer an e-learning environment for [students], to manage information, to create portals that cultivate virtual community, and to facilitate research collaboration among professors at various universities. The possibilities provided by the open source movement are limited only by the imagination" Optimized Learning Inc (2005) ://www.optimizedlearn.com/

Sakai is becoming one of the most popular open source packages across the world. It has all the above advantages of the open source packages; as a result it was adapted by many universities. Among the first adaptors are Indiana University, Universidade Fernando Pessoa, Universitat de Lleida, University of Cape Town, University of Michigan, University of California, University of South Africa and Yale University. Members (academic institutions, non-profits or commercial partners) of the Sakai pay the membership fee of $10,000 per year for three years. Institutions with a student base of less than 3000, pay the reduced fee of $5000 (Hancock, Knoop & Zeckoski, 2006). Therefore, not all open source is free as often packags comes with a membership fee.

It has all the important tools required by the facilitators for designing their Web learning based on their personal qualities, knowledge, skills and their experiences. The tools are as shown in Appendix VI according to Hardin (2006).

Some requirements for the facilitators to be advanced in using LMS are that they must have Internet connection and be able to make use of / synchronous communication tools, web image tools, HyperText Markup Language (HTML), web sites and presentation software (e.g. Microsoft PowerPoint) (Depow, 2003). However, if they do not need the advanced stuff then there is no need for them to learn these because they would only have to follow the manual of their specific LMSs. Appendix VIII also presents many different kinds of LMS.

### 2.5.3.3 Designing a web site for teaching and learning (software development)

Designing a web site is the most difficult ring of the three rings for the facilitators because it needs advanced knowledge and skills used in designing a web site and learning theories. This ring uses the other two rings because they are also a product of this ring. In order to use it one needs to understand the use of all the tools mentioned in the above two rings as well as Email, Email list software (i.e. "listservs"), Threaded discussion tools, Linear discussion tools, Instant Messaging (IM) tools, Chat tools (IRC, java, html, voice), Web page publishing, FTP, Groupware tools, Advanced programming language authorising software (it is designed to let facilitators design their modules), research knowledge / skills and teaching / learning theories / methods.

The above knowledge and skills are required in order to use the Web for learning in the production of the virtual reality that enables the use of multimedia in teaching and learning. Virtual Reality is the creation of an artificial environment that the Internet users can experience (Huber, 1990). It includes something like virtual classrooms, virtual libraries and virtual institutions.

Multimedia is the integration of text, graphics, video, animation and sound presented on the Internet Web page or site (Levine, 2004). Multimedia environment works hand in hand with Telnet to promote a good environment for web learning, which includes good teaching and learning resources like games and others. “Telnet refers to an Internet protocol that enables users to log on to a remote computer on the Internet as if they had a direct local connection” (Shelly *et al,* p.7.3). It also involves playing games, the use of Usenet and IRC on the Internet. Usenet refers to a collection of newsgroups (discussion groups and news), which are accessed via the Internet. IRC is an Internet programme that allows users to join other users in real-time conversations on the Internet.

The knowledge and skills required for this ring (of the three rings) are also useful in the utilisation of an Avatar, Web 2.0 and Web 3.0 with Semantic Web in teaching and learning. The term "avatar" comes from Hindu mythology, and

originally was the name of the temporary body that God uses when visiting Earth. In virtual communities, an avatar is a graphical representation of a participant. Avatars may also be called "characters", "players", "residents", or "citizens" (Copeland, 2003). In Web-Based Teaching and Learning (WBTL) or Web learning avatar is one of the powerful elements that cannot be easily ignored by Web users.

Web 2.0 is perceived as a method of remixing older technology with new technology in order to change the whole attitude of using the Internet (Anderson, n.d). It is done through the use of four basic applications that are capable of combining different technologies with an aim of promoting collaboration and communication. According to Anderson, (n.d) these applications are: social networking, blogging or blogs, wikis and tagging.

Social networking helps people find and communicate with other people or organisations of similar interest. The three most popular social networking are: Facebook, MySpace.com and 43Things.

Blogs were limited to text and later they started to accommodate or expand into sound and video technologies as valuable tools for proposals of new ideas, announcements, designing a simple website, commentary and editorials. Blog has been involving Really Simple Syndication (RSS) technology which has been making possible for users to subscribe to a blog and receive updates automatically whenever those blogs are updated (Amory, 2006).

Wiki is a website that can be edited by anyone who visits it. Most websites ended up including the wiki for peer review purposes. Allen (2008) believes that the most popular wiki at the moment is Wikipedia and its affiliates.

Tagging is a method of using internet content by tagging it with descriptors of that content for easy access to other users as well as when they search for information. A combination of different tags such ‘university’, ‘technology’ and ‘education’ for example may produce a long list of concepts such as ‘university

of technology', 'technology education', 'educational technology', and more. Tagging is also known as folksonomy (Zimmer, 2008).

It is important to notice that all these four applications that make the Web 2.0 are not new because they can be traced back to as early as 1990's (first blog), 1995 (first Wiki) and 2004 (term Web 2.0) (Zimmer, 2008). According to the inventor of Web 1.0 (World Wide Web) Tim Berners-Lee the term (Web 2.0) cannot be used in any meaningful way, as long as it still use many technologies that have been used by Web 1.0 or WWW (Allen, 2008). Other powerful websites such as ://youtube., ://video.google., ://blogger. and ://technorati. have managed to promote the concept of the Web 2.0 by combining these four applications.

On the other hand Web 3.0 is also pushing its way in by trying to replace the Web 2.0. Web 3.0 is predicting the future of the Web after the Web 2.0. It describes the evolutionary stage and introduced to hypothesise about the future of the Web (Markoff, 2006). Semantic Web is a good example of the Web 3.0.

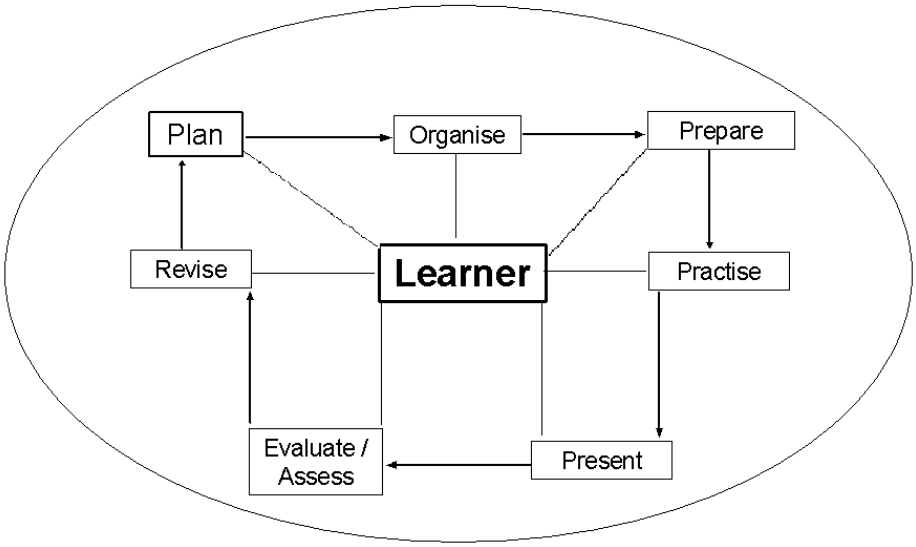
The Semantic Web is a mesh of information linked up in such a way as to be easily processable by machines, on a global scale. It is just an efficient way of representing data on the World Wide Web (WWW). The Semantic Web is Tim Berners-Lee's (Inventor of the WWW) idea. There is a team that was tasked to this project in order to improve, extend the system and accommodate many languages, publications and tools that have been already developed. But, "the Semantic Web technology is still very much in its infancy, although the future of the project in general appears to be bright," (Brickley, 2004).

This means any information that is hidden away in Hyper Text Markup Language (HTML) will be disclosed once the project is finished. This suggests that the Semantic Web can be seen as an extension of the current web, which is being reshaped to accommodate reusing and sharing of data across applications. This further suggests that it will cover these areas, because Berners-Lee, Hendler and Lassila (2001) define the Semantic Web as the extension of the current Web in which information is given well-defined

meaning, better enabling computers and people to work in cooperation. Other important issues of the Semantic Web are Uniform Resource Identifier (URI), Resource Description Framework (RDF), Notation 3 (N3) and Screen Scraping and forms.

### 2.5.3.4 Systems approach between the rings

Figure 2.2**: *Systems approach (Web Learning)***




This study suggests that in order to have powerful Web learning one needs to first transform the old systems approach that was dominated by behaviourism elements to the one that is presented in Figure 2.2, where students needs are controlling the whole system with the aim of changing the system into a process that is dominated by students needs.

In terms of this study, the second stage after planning may be organising all the elements that have been planned (bringing them as planned). Students should always come first in one's mind. This study uses a certain number of stages, but that does not mean that facilitators will have to follow them sequentially. Any stage can start according to their students' needs.

The third stage may be the preparation stage where one has to connect all the elements of Figure 2.2. This is also the step where one has to visualise these

elements as if they are taking place in a practical situation (Palloff & Pratt, 2001).

The fourth step may be to practice the whole system with different processes before one puts it into a practical situation. The fifth stage is to put into practice the system (with the different elements) one has practiced. In other words one has to teach the course that was planned, organised, prepared and practiced.

While the presentation stage is taking place the evaluation or assessment stage (sixth stage) is also taking place because it is a stage with so many levels (formative, confirmative and summative). The final stage may then be the revision of the whole system (the whole course) that takes one back to that first stage again to start afresh. The systems approach does not end because even if the outcomes have been achieved, it might happen that they were too simple / easy for the target group. Or they may not have been achieved because one or more stages are letting the whole system down.

Facilitators use this planning stage to define the purpose of their Web learning. In order to prepare any effective web learning, facilitators establish a positive mind-set by valuing their information and visualising their students responding (Palloff & Pratt, 2001). They prepare their attention-getting homepage based on the students' needs and interests. They also include evidence and visuals in a form of linked icons that explain or demonstrate certain steps of action (Smith & Ragan, 1993). The whole process is on knowledge construction and production rather than knowledge re-production.

Most importantly, good facilitators always review their teaching and learning before they publish them for their students (Lynch, 2002). They review them for relevancy, quality, mistakes correction, eye-appealing, readability, clarity, memorability and additional information.

## 2.6 THEORETICAL FRAMEWORK

This study is shaped or given a direction by Activity Theory (AT) as a theoretical framework and a theory of social constructivism. This study is using these two concepts in this study because the participants indicated that their main aim was to try to use AT as a theoretical framework for designing social constructivist Web-Based Teaching and Learning (WBTL) environment. They kept on emphasising the issues of constructivism in their Web for teaching and learning. In other words they were working as subjects with the aim of trying to transform material and ideal objects into desired outcomes. They told the researcher that their target audiences were expected to learn by constructing knowledge. This study was then forced to use the same tools (AT and Constructivism) in the design analysis of the Web as a delivery mode in teaching and learning in South Africa. These tools were used because in this study it was strongly believes that in order to achieve realistic outcomes one needs to use the same tools that are being used by one's participants. Then the question to be answered here before the tools are being used is 'what exactly is the Activity Theory (AT) or Constructivism?

### 2.6.1 Activity Theory

According to Waite (2005), Activity Theory (AT) provides a descriptive framework for the Human Computer Interaction (HCI) professional through which they can better understand and classify the cognitive, physical and social processes involved in performing a specific task, and how those tasks can be related to a larger motivating activity. According to Nardi (1996), Activity Theory does not predict the future, instead it describes situation and tools. The researcher thinks this is also good because if one wants to use a certain tool one has to identify ones target audience and its characteristics based on the description of the tool. Therefore, it is very important that when one is involved in an activity, to first understand all the cyclical components of that activity. By understanding all the components using AT one will be able to predict one future relevant target audience for the tool to be used.

But, starting with Activity Theory (AT) as a theoretical framework one needs to first discuss the six principles as identified by Kaptelinin (1997) as follows**:** The unity of consciousness and activity; object-orientedness; the hierarchical structure of activity; Internalisation-externalisation; tool mediation; and development.

### *2.6.1.1 The unity of consciousness and activity*

Kaptelinin (1997, p.107) identified the most fundamental principle of activity theory as

> "that of the unity of consciousness and activity. Consciousness in this expression means the human mind as a whole, and activity means human interaction with the objective reality. This principle, therefore, states that the human mind emerges and exists as a special component of human interaction with the environment. The mind is a special organ that appears in the process of evolution to help organisms to survive. Thus, it can be analysed and understood only within the context of activity."

During this process of unity between the consciousness and activity, a subject can be identified as represented by the consciousness. The subject is the one who initiates the process of trying to transform material and ideal objects into desired outcomes. For this study the subjects are facilitators (lecturers). The activity for the facilitators (lecturers) is identified as 'the design and management of the web as a delivery mode for teaching and learning.' But, for me as a researcher it is identified as 'a design analysis of Educational Technologist's Web-Based Teaching and Learning environments in Higher Education institutions in South Africa.'

### 2.6.1.2 Object-orientedness

The subjects work on objects as a part of their activities with the aim of transforming ideal objects into desired outcomes. The objects may be physical or non-physical. For example, issues like perception, experience, knowledge,

learning / teaching and many others can be identified as the objects in a certain relevant context.

Some of the objects that are identified in this study are the web, teaching, learning, and delivery mode. In most cases subjects find themselves working with more than one object. So, it is very important for the subjects to identify the activities and objects before they even start. By so doing know exactly the kinds of tools needed for the activity.

#### 2.6.1.3 The hierarchical structure of activity

According to Engestrom, Miettenin and Punamaki (1999, p.4), activity is divided into three levels. The levels are as follows,

> "the uppermost level of activity is driven by an object-related motive (or objective); the middle level of individual or group action is driven by a goal; and the bottom level of automatic operations is driven by the conditions and tools of action at hand."

In other words the three levels are simplified as activity with motives, action with goals, and operation with conditions.

Activity level (first level) is performed by both an individual or group and a community. For example, facilitators in this study were working with their communities (learners, technical support, course coordinators, etc). So, it is very important for the subjects (facilitators) to always keep lines of communication open to all members of the community. This will ensure that if the subject in a particular important area leaves an activity unattended, another member of the community can quickly pick it up. Therefore, this level should not be disturbed, because Kaptelinin (1997) found that when a motive is frustrated, people are upset, and their behaviour is most unpredictable. When this occurs, it is not easy for the activity to survive in order to achieve the outcomes.

Action level (second level) is performed by an individual or a group with experience in that particular area. Actions are processes that are working subordinated to the activity level, because they are directed towards a particular

goal. Kaptelinin (1997) states that if this level is frustrated it is necessary to set a new goal for the next action.

The operation level (third level) is automated for factors of a particular current condition that need responses from people or machines. For example, facilitators may have a web learning space ready for learners so that if there is a need for the learning space they then use it. If operations are frustrated because familiar conditions are changed to something else, people often do not even notice and automatically adapt themselves to the new situation (Kaptelinin, 1997).

Therefore, it is very important to understand the three levels in order to predict any change in people's behaviour. So, one should understand if such a behaviour change is a result activity (motive), action (goal) or operation (conditions) and then treat it according to the relevant level. The researcher believes that these levels are equivalent to those that are mentioned by Chapman (2001), namely: 'unconscious incompetence', 'conscious incompetence', 'conscious competence' and 'unconscious competence.' The first two stages are equivalent to the activity level (motive), because facilitators need more support or contribution from their communities. The third stage is equivalent to the action level (goal), because although facilitators can be competent they still need to concentrate on the activities they are doing (things are not happening automatically). The last stage is equivalent to the operation level (condition) where things are to happen automatically with or without any major concentration on the activities that they are doing.

#### 2.6.1.4 Internalisation- externalisation

This principle of AT emphasises the importance of mental processes that take place because of certain actions that are more external (something that was observed or seen) than internal (taken from one's experience). Although they are derived from the external they are processed internally and then reflected in an external action performed by someone who has been engaged in the

process of internalisation. Therefore, people acquire abilities that are either internal or external.

### 2.6.1.5 Tool mediation

Most activities, if not all of them, in teaching and learning situations, are mediated by certain tools (teaching and learning resources, e.g. books, videos, over-head projectors and computers). The tools carry cultural knowledge and social experience in order to shape the way people act. Tools may be internally or externally generated. For example, some of the tools that were identified (both externally and internally) as the tools for this study are: understanding the HyperText Markup Language (HTML), understanding methods of teaching or learning, understanding of hyperlinks, understanding some of the search engines, understanding some of the Learning Management Systems (LMS), references, books, web sites, journals and many others. It is important for the facilitators to motivate their learners to learn with tools (teaching and learning resources) instead of learning from tools. Learning from tools does not trigger the learners to be creative, but instead teaches learners to become passive agents (Amory, 2006). A good combination of human abilities with tools is important in promoting effective and efficient teaching and learning situations (Brophy & Alleman, 1991).

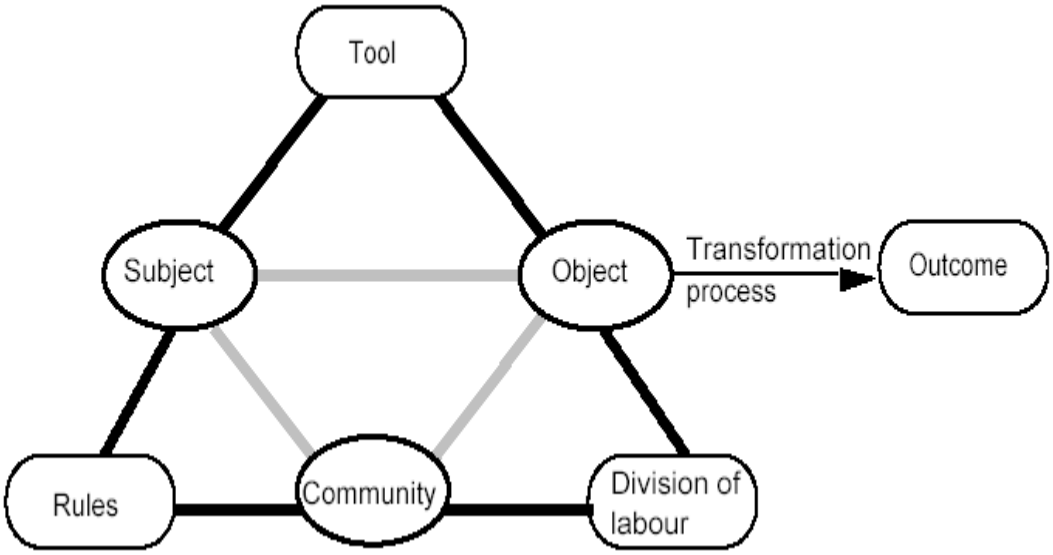
### 2.6.1.6 Development

This last principle brings in the importance of studying and understanding the phenomenon in terms of its culture and history of development in the current situation. This principle also emphasises the importance of clarifying all the elements that disadvantage the phenomenon in the current situation and to come up with solutions.

### 2.6.1.7 Model of Activity Theory (AT)

AT, like most other theories, has different models that were developed by different researchers such as Vygotsky (1981). Later it was reformulated by others such as Engestrom (1999) into a classic model of Activity Theory. Kuutti (1995) draws it as shown below in figure (2.3)

**Figure 2.3 (Engestrom's model of Activity Theory)**




The first model from Vygotsky had a triangle with three blocks namely: subject, object and tools, as the researcher has discussed them as part of the principles. Engestrom added the other three blocks namely: community as discussed above as well as rules and division of labour.

It makes a lot of sense to add these three blocks, because for instance if facilitators are involved in a certain activity with their communities, they must have certain rules to follow in order to achieve the intended outcomes. Some of the rules for this study are synchronous interaction, asynchronous interaction, collaborations, practices and others that are specific to the facilitators and others for the different categories of the community members.

The division of labour in this study indicates that duties to be performed are divided into those that should be performed by the facilitators and those that should be performed by individual / group members of the community. That is,

duties for the facilitators, for the learners, for the technicians, for colleagues, for support staff, for group of learners and for the institution management.

Some of the outcomes that were studied in this study were: to manage the learning space effectively and efficiently, to deliver education to learners in order for them to construct knowledge and many others that are discussed in Chapter 5 and 6.

#### 2.6.1.8 Concluding comment on AT

All these principles are working together to form an integrated Activity theory. They are not isolated from each other if they are in action. The principles have been used to form the initial categories for analysis for this study.

Sometimes it is difficult to understand the most important area of the AT, but if one finds oneself in such a dilemma one will have to use the above model (figure 2.3) to visualise important issues of AT and identify some elements of each of these principles.

### *2.6.2* Constructivism

Constructivism emphasises on the use of learners' previous experience to construct new knowledge as indicated above. It mainly aims at ongoing structuring processes resulting in constructing knowledge. Constructivists believe that reality is constructed through human activity. Reality is something that cannot be discovered by anyone, because it does not exist prior to its social invention (Kukla, 2000).

The most important element of constructivism that the researcher has noticed is that there is a shift from the traditional methods of teaching (teacher–centred) to learning methods (learner–centred) in most activities that are being performed today in teaching and learning. For instance, the South African government encourages the use of Outcomes Based Education (OBE) as an approach in education and training. In order to apply OBE approach in education and training one needs to adopt the constructivists' way of thinking about reality (Asmal, 2003).

Constructivism like activity theory involves a teaching and learning community that consists of learners, facilitators, tutors and other experts in that area. They are all working on the same activity to achieve the same outcomes. In order to achieve those outcomes they use interaction, collaborations and many other suitable methods. Vygotsky (1978) cited by Khvilon and Patru (2002) believes that everything is learned on two levels. At first one needs the community for interaction purposes and then one needs to use one's individual experiences to integrate into ones mental structure (construction of knowledge) in order to learn.

It is not common that only one person has all the required skills needed to develop a complex web learning environment. Certain responsibilities should be considered according to Carliner (2000). Those responsibilities include the following:

- The Web learning leader (facilitator) who is there to see which skills are needed by the students to achieve the outcomes. S/he also makes sure that other community members do their job to support students. According to Mezirow (1990), the role of the educator is to: help the student focus on and examine the assumptions that underlie their beliefs, feelings and actions; assess the consequences of these assumptions; identify and explore alternative sets of assumptions as well as to test the validity of assumptions through effective participation in reflective dialog;
- An instructional designer to define the activity (problem) and develop a blueprint for a solution;
- Students: As a part of a community of knowers, students share the responsibility for constructing and creating the conditions under which learning can occur (Taylor, 1998). Therefore the main aim has to be about transforming the role of the student from information receiver to navigator, active student, information interpreter, and implementer of knowledge;
- An information developer to write the text of the web designed for learning and expands upon the design provided by the instructional designer;

- A graphic designer to prepare the visual designs for the course which may include animated images;
- A programmer to prepare the interactive sequences of the course that cannot be produced by means of any authorising tools;
- An editor to review the whole web designed for learning. S/he reviews it for consistency, adherence to guidelines and recommends what should be done;
- A tester to test the course if it is ready for the implementation stage;
- A video specialist to produce video sequences;
- An audio specialist to produce audio sequences;
- Subject matter experts (SME) to assist with choosing content for the course. Facilitators can also come in here and perform this duty and;
- Sponsors to financially support the course.

The literature review has shown that constructivism is the most dominating theory for WBTL. The participants of this study also revealed that almost all of them are in favour of constructivism. As a result they use it as one of their approaches in designing their WBTL environments. Therefore, this study had to use constructivism in order to accommodate all the issues of constructivism that emerged from both the participants' practice and the literature review.

## 2.7 CONCLUSION

This chapter has discussed the concepts of Educational Technology as it has been influenced by the WBTL. The review of literature has suggested that in WBTL, environments are underpinned by systems approach, behaviourism, cognitivism and constructivism amongst other principles. Constructivism has revealed itself to be the most dominating principle. This chapter has also discussed the facilitators' frames of reference, the researcher's reflection with The Tree Three Rings (TTTR) and Activity Theory (AT). Recent studies on the WBTL have been presented and discussed in order to contextualise this study.

There the next chapter (Chapter 3) presents the research methodology for the study. It involves development design, case study, sampling (convenience sampling) and research instruments (semi-structured interview, document analysis, observation schedule and questionnaires).

# CHAPTER 3
# RESEARCH DESIGN AND METHODOLOGY

## 3.1 INTRODUCTION

This chapter outlines the research orientation of this study. The following aspects are covered: research development and processing steps; research approach; sampling method and research instruments. Categories for analysis are also indicated.

There is widespread discourse about the nature and scope regarding research in the human sciences. There is no universal agreement on the best research approach required to undertake investigations into problems within social sciences and as such the researcher kept an open mind in terms of flexibility of approaches. Research into the role, policy and practice of Web designed learning environments has become very topical within the international education landscape. In South Africa, however, there is a paucity of research into Web-Based Teaching and Learning. This study thus had to rely heavily on what is being done by facilitators for teaching and learning through descriptive case studies.

The main current debate among Educational Technologists is whether or not to continue with experimental (including comparative studies) research approaches in conducting any Web learning study. Most educational technology researchers (Herrington, Reeves and Oliver, 2004) are in favour of development research. For this study a model (Figure 3.1) has been sketched to illustrate how development research approach was used for this study as a big issue of debate for Educational technologists. This study had to use this approach as a powerful tool to extend boundaries in Educational Technology and give the study the most important stages to guide the study as shown in figure 3.1.

## 3.2 METHODOLOGY

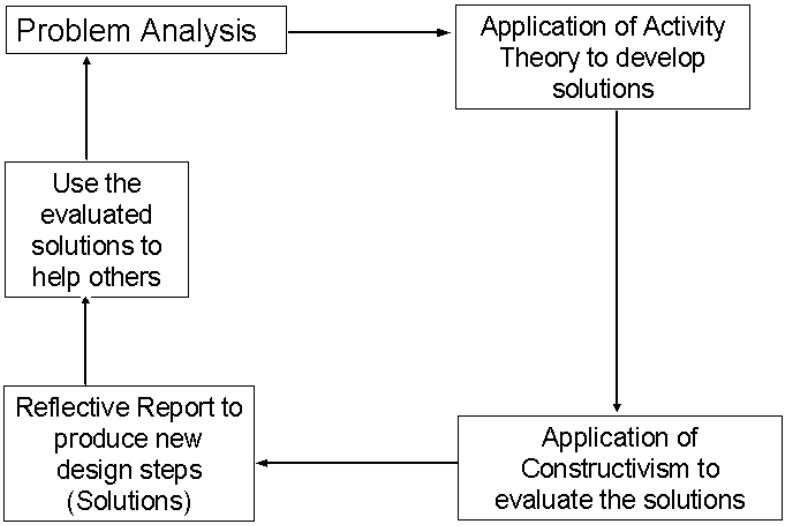
### 3.2.1 Development and Processing steps – research design

This study is in line with the above mentioned debate, because it has applied the first four important stages for the development research as recommended by Herrington, Reeves and Oliver (2004) in planning and processing a development research. Though the study is dominated by qualitative research, it also has some elements of quantitative research in terms of its sampling and instruments (questionnaires). Qualitative research is important in information systems research because of the rich insights it provides into problems which are not well understood (Potter, 2002). Therefore, qualitative research is suitable for this study because it requires gaining an in-depth knowledge and deeper understanding of the design of the Web-Based Teaching Learning (WBTL) environment designed by the research participants of this research.

Further more qualitative case study is important for this study because it is more descriptive, holistic, explorative and contextual in its design with aim of producing rich description of any investigated phenomenal (Creswell 1998). For this study qualitative case study has helped me to understand the deeper meaning of the lecturers' experiences and challenges in terms of using WBTL environment in teaching their modules. Therefore, the results cannot be generalised because the study deals with specific cases of demanding expectations by South African universities of their Educational Technology lecturers.

A preparation of qualitative methods in this research through the methodology employed has led to the new stages (principles) in WBTL (see Chapter 6). Figure 3.1 (Development and Processing Stages) presents the five stages model that has been used for this study to plan, develop and process it. This development research has been extended from Herrington, Reeves and Oliver (2004).

**Figure 3.1: Development and Processing Stages**




The study started with the first stage by analysing WBTL environments used by research participants. In the second stage Activity Theory (AT) was applied to produce categories for analysis. In the third stage constructivism learning theories applied to strengthen AT as well as to evaluate and test the solutions in practice. Although AT was used as the main frame for the whole study, it was also used to produce categories for analysis (Chapter 5) together with constructivism. In the fourth stage a reflective report was written as suggested by Fraenkel and Wallen (1996) in order to produce the new design stages (principles) for the WBTL environment (as presented in Chapter 6). Finally (fifth stage), is now the application of the evaluated solutions in order to improve the use of the Web in teaching and learning and also help other facilitators in their interpretation of the solutions (in terms of stages).

Herrington, Reeves and Oliver (2004) identified four principles of the development research in their study. The phases are analyses of practical problems, development of solutions, testing the solutions and documents and reflecting on them. Their principles are similar to the stages that were followed in designing this study.

Therefore, it is clear for this study that development research is the way to advance educational technologists' research as it has proven to be useful in this study: firstly, in that the development of this field of research is relatively new and secondly, the design strategy allows for continual trial, evaluation, reflection and development. The use of development research helped the researcher to identify and apply AT which then led to the use of the interpretive research paradigm with both qualitative and quantitative methods.

### 3.2.2 Research approach

The researcher opted for the interpretive research design approach as the study lent itself well towards qualitative dominated research method. According to Creswell (1998), qualitative research which includes limited elements of quantitative method is desirable in social sciences as it allows for incremental data collection, i.e. adopting a mixed mode methodology results in understanding the extent to which a phenomenon exists as well as what meaning it brings to the particular context. The study also opted for the interpretative design mode in order to better understand the experiences and perceptions of participants in the way they plan, design, utilise and evaluate Web-Based Teaching and Learning (WBTL) environments.

Potter (2002) argues that qualitative research is important in Web-Based Teaching and Learning research because of the rich insights it provides into problems which are not well understood in the digital world. The researcher thus felt that a combination of both qualitative and quantitative research is most appropriate for this study as it involves gaining an in-depth knowledge and deeper critical understanding of the design of WBTL environments (Patton, 1990). The study had to use multi research instruments to avoid differences in data collected by means of the two methods (qualitative and quantitative).

### 3.2.3 Research methodology employed in this study

A case study research type was found to be a useful guiding line for this study. According to Berryman (2003) case studies are important if one is using it as part of educational entity. Bertram (2004) sees the case study as it falls under the umbrella of naturalistic research which is conducted in real-world contexts and often used by researchers in the interpretive paradigm. This research is a case study of WBTL environments designed by the research participants chosen for this study from the four universities. The four universities within South Africa were the case studies used in this study. Fifteen South African universities were invited to participate in this study. However, only four of these institutions volunteered to participate in this study. Hence the four case study universities were selected through their willingness to participate in this project. Access was thus the main indicator for inclusion in this study. No major problems were experience in working with the four universities. The four universities encouraged the eight facilitators and forty students to participate effectively. The four universities in South Africa are given the following names (not real names) for confidentiality: INSTITUTION 1 (with Respondents 1a & 1b); INSTITUTION 2 (with Respondents 2a & 2b); INSTITUTION 3 (with Respondents 3a & 3b) and INSTITUTION 4 (with Respondents 4a & 4b). Although the study is dominated by the case study it also includes some elements of a survey approach in terms of research instruments. The researcher sets out to understand, analyse and describe a setting. The main orientation for this is a case study, which is an in-depth study of a particular case formed by each of the eight facilitators.

### 3.2.4 Sampling

The convenience sampling through the access process is a non-probability sampling scheme. Convenience sampling is when the most convenient or accessible elements of the population are selected (Fourie, 2000). Bertram (2004) indicates that sampling involves making decisions about which people, settings, events or behaviours to observe. What will be studied depends on the unit of analysis. The unit of analysis may be in a form of a group, an individual or an organisation. For this study the unit of analysis is a group of facilitators and their students. Letters were emailed to the participants and their institutions

asking them to participate in the study (as shown in Appendix I, II & III). The participants were told of confidentiality and that they were free not to participate as indicated in Appendix I, II & III. They all recommended that their real names should not be used or revealed.

The sampling for this study began with one facilitator from each of the four universities. Each facilitator was asked to identify a colleague who used the Web in teaching and learning as well as five learners from his or her class. The second facilitator from each university was recommended by his or her colleague (first facilitator). The second facilitator was also asked to generate five learners from his or her class. The study ended up with a total number of 48 participants (two facilitators and ten learners from each institution) as shown in Table 3.1. Table 3.1 also shows the given name to the four institutions and the demographics of the participants.

Below is a brief description of each of the four universities as described by their participants. The names of the facilitators and universities have been changed in order to maintain anonymity because participants indicated that their names and their institutions should not be revealed.

According to Respondent 4a and Respondent 4b (pseudo names given to the facilitators from the respective universities)

> *'INSTITUTION 4* [pseudo name for the university] *is Africa's* […] *learning institution. We are a reputable, comprehensive, flexible and accessible* […] *learning institution. We offer internationally accredited qualifications and have world-class resources that inspire learners to create meaningful futures on their own terms. [We do this] by forming partnerships in Africa and throughout the world, we are able to help the people of Africa achieve their dreams.'*

According to Respondent 2a and Respondent 2b, INSTITUTION 2's is to be

> *'a leading University* […] *in Africa that nurtures holistic education and the advancement of knowledge. To serve the needs of developing*

*societies within a dynamic global context and to enable quality teaching, learning, research and community engagement by , career-focussed education, and a values-driven ethos; sustainable partnerships with industry, community and society excellence in applied and relevant research as well as and students to succeed and ensuring institutional sustainability*.'

According to Respondent 1a and Respondent 1b, INSTITUTION 1

*'aims to be a truly […] university that reflects the society in which it is situated – not only in terms of race, gender and class – but in terms of how it structures its values and priorities and how it responds to social needs. As an institution of higher learning, it is committed to academic excellence, innovation in research and critical engagement with society. With its vision to be…, the University […] draws inspiration from an African identity and takes seriously its responsibilities to the development of the African continent*.'

According to Respondent 3a and Respondent 3b, INSTITUTION 3

*'is to be an outstanding teaching and research university, educating for life and addressing the challenges facing our society. We are committed to academic freedom, critical scholarship, rational and creative thought, and free enquiry. It is part of our mission to ensure that these ideals live; this necessarily requires a dynamic process of finding the balance between freedom and responsibility, rights and obligations, autonomy and accountability, transparency and efficiency, and permanence and transience; and of doing this through consultation and debate*.'

**Table 3.1:** Sample Population (characteristics)

| Institution given names | INSTITUTION 1 | INSTITUTION 2 | INSTITUTION 3 | INSTITUTION 4 | Total |
|---|---|---|---|---|---|
| Number of white facilitators as participants | 2 (Respondent 1a & Respondent 1b) | 1 (Respondent 2a only) | 1 (Respondent 3a only) | None | 4 |
| Number of African facilitators as participants | None | None | 1 (Respondent 3b only) | 1 (Respondent 4a only) | 2 |
| Number of Indian facilitators as participants | None | None | None | 1 (Respondent 4b only) | 1 |
| Number of coloured facilitators as participants | None | 1 (Respondent 2b only) | None | None | 1 |
| Number of learners as participants | 10 (4 White, 3 Indian and 3 African) | 10 (4 Indian, 4 African and 2 White) | 10 (5 White, 3 African and 1 Coloured) | 10 (6 African, 2 White and 2 Indian) | 40 |
| Total number of participants | 12 | 12 | 12 | 12 | 48 |

### 3.2.5 Research Instruments

According to Potter (2002, p.124), “literature is not the only way to find out about the topic in a particular subject. The quickest way to find ‘where things are at’ is to ask someone who will understand. Talking to people who are very familiar with the topic is an excellent way to speed up finding out how things happened”. However, “there are many other methods of contacting people namely, conferences, interviews, organising workshops, giving a seminar, setting up a computer conference and the Internet” (Potter, 2002, pp.125-6).

This study used the observation schedule (with the same issues that are indicated in Appendix IV) and the semi-structured interview instruments (Appendix IX) during the workshops and five days later after the workshops. They became the most suitable instruments (primary data) because the researcher used a case study approach.

After the workshops two questionnaires (Appendix IV & V) were prepared because of the large geographical distance between the researcher and most of the four universities (Appendix V). The questionnaires were also used for triangulation purposes. The study began by piloting these instruments as suggested by Anderson (1993). He recommends that in order to assess the validity of the research instruments, and to check on the nature of the instruments, one needs to pilot the instruments to be used.

A document analysis was also included in the data collection plan. Student files, facilitators files, course notes and journals.

The instruments were administered more than once in some cases which indicated that data collection is not just a once off event, but it is a process. According to Creswell (1998) data collection is a series of interrelated activities aimed at gathering good information to answer emerging research questions. The study engaged a series of activities in the process of collecting data. Creswell (1998) even suggests that any study undergoes the processes of locating site or individuals, gaining access and establishing rapport, sampling, collecting data, recording information, resolving field issues and storing data. As a result of these processes it was difficult to motivate certain participants who

did not have the time to participate fully because of other commitments. But, the study was managed under these processes to collect data using the instruments (as discussed below) for primary data.

### 3.2.5.1 Observation schedule

Golafshani (2003) recommends that interview and observation methods are dominant in the naturalistic (interpretive) paradigm and Eisner (1991) says that observation is a qualitative method of collecting data (Eisner, 1991). Based on these two recommendations it was important to use the scheduled observation sessions (most of the items that were observed were the same as that of the questionnaires) and it even became evident that the researcher played a role in the setting, in addition to the research. Specifically, the researcher operated as a privileged observer in some cases. The researcher operates as a privileged observer, because the eight facilitators acknowledged the researcher as one of them. Therefore, the access into the facilitators' WBTL environments was easy. The observation was useful because it was easy to watch the setting unfolding. Denzin and Lincoln (2003b) believe that one cannot study the social world without being a part of it. So one of the ways to achieve this was to use the observations which, Denzin and Lincoln (2003a) contend, imply simultaneous emotional involvement and objective detachment.

Each member from the sample was observed at least once. This means that all the participants were observed, when using the Web in teaching and learning. The observation was used to collect data in order to answer all the questions that have to do with the 'how' part of the study. In other words any question from the study that came with 'how' was answered by means of the observation.

### 3.2.5.2 Semi-structured interview ( _)

The semi-structured interviews were used to collect data in order to answer all the questions for this study that have to do with the 'why' parts of the study. The semi-structured interviews follow the observation, where the participants were asked questions in order to clarify why they were doing or using what they were doing or using. The reasons for using the semi-structured interviews were that they allow in-depth collection of data to be achieved. In-depth data is achieved,

because they provide an opportunity to probe and expand the respondents' responses. They allowed this study to alter the sequences in order to probe more deeply; this was also observed by Fourie (2000). They also helped to cope with those respondents that seemed to have a tendency to avoid certain questions. As a result the semi-interviews were open-ended because it was free to employ some questioning techniques such as rephrasing, paraphrasing and probing when the need arose.

**3.2.5.3 Questionnaires** ( )

The questionnaire (developed similar themes to those observed and used during the scheduled observation) was used because most of these participants were far away from the researcher, to triangulate and to answer all the questions of this study that have to do with the 'what' parts of the study.

The questionnaire was also used because it was prepared to measure facts, motivation and knowledge (Pettigrew, Fidel & Bruce, 2001). This means the different types of questions that were used were factual, motivational and knowledge questions. A combination of open and closed questions was used. It was used in order to allow each and every participant to respond at least to certain questions. Specific questions that were included were rating questions, dichotomous and filter questions as well as follow up. They formed part of the main questions.

The open types of questions were included specifically to capture the respondents' ideas spontaneously in their own words. On the other hand closed questions (in form of rating) were included in order to focus immediately on details. Fourie (2000) observed that most of the population has the intellectual ability to answer the closed or rating types of questions. Therefore, the questions tried to accommodate even the respondents that were shy, those that did not have much time and those who do not express their opinion easily. The questionnaire was found to be less time-consuming.

However, the researcher had to be careful of the primary disadvantages of the instrument especially the questionnaires as indicated by Govender (2001). He

indicated that “the primary disadvantages of the questionnaire[s] are non-returns, misinterpretation, and validity problems” (Govender, 2001, p.204). It was found that although these disadvantages were in existence, they were managed.

The participants were contacted and checked most of the time if they had time to answer all the questions to avoid the non-return problems. In terms of the misinterpretation the study had to involve only the technical / educational terminology (which can be easily understood by the participants as they were observed) for the Web. The questionnaires were also used after everything had been observed to avoid the validity problems.

#### 3.2.5.4 The second questionnaire ( _)

The questionnaire which includes both the facilitators and learner (Appendix V) was used for triangulation purposes and for getting students’ views as well. This questionnaire helped in establishing whether the data that was collected from the facilitators was consistent. The first questionnaire only collected data from facilitators.

#### 3.2.5.5 Document analysis

Initially, the study was going to use reflective journal as a powerful tool for thinking about what was observed as suggested by Fraenkel and Wallen (1996). But it was decided to use document analysis, because reflection was going to come as part of the data analysis (Chapter 4). But the study needed another method that was going to work as another primary source for triangulation. Then the document analysis method was applied which ended up working as a primary source because it provided useful data from the primary participants for triangulation. Student files, facilitator’s files, course notes and journals were analysed to collect more data for triangulation purposes. The data from this instrument was used in order to establish the causes of inconsistencies within data collected from the other instruments.

## 3.3 CATEGORIES FOR ANALYSIS

In terms of data analysis this study used guided analysis where researchers have categories that can be modified through interaction with data (Freeman & Richards, 1996). Activity Theory (AT) and constructivism were used as the most appropriate frames to build the categories for this study in terms of analysis. Categories of analysis were formed by the literature on AT (Engestrom, 1999) and others were developed from the data that was influenced by constructivist learning theory as it was used by the facilitators. Issues that merged from the data were grouped into themes and discussed.

## 3.4 CONCLUSION

The effectiveness of using development research (of qualitative and quantitative), case study, snowball sampling, schedule observation, semi-structured interviews questionnaires and documents analysis as part of one's study was experienced. The chapter has presented and discussed the method of combining all these parts in conducting a study from the field of educational technology's point of view.

The next chapter (Chapter 4) presents all the findings that were generated using the five types of the above mentioned research instruments. The three key questions were used to frame the presentation of findings by answering the first two [What are the experiences of Educational Technology facilitators regarding the use of web technologies to promote Web-Based Teaching and Learning (WBTL) and What teaching and learning philosophy informs the design of Web-Based Teaching and Learning (WBTL) environments?] together first and the third one [How do students experience learning through the WBTL environment?] thereafter.

# CHAPTER 4
# FINDINGS AND INTERPRETATIONS

## 4.1 INTRODUCTION

This is a case study of eight Educational Technology (ET) facilitators who design and use Web-Based Teaching and Learning (WBTL) environments in teaching ET modules or courses. The study explored their WBTL environments to answer three critical questions (see section 1.3). Their WBTL environments were explored with an aim to understand both the Technology in Education (Web technologies) and Technology of Education (Web approaches).

Therefore, this chapter presents findings of the study. The findings are interpreted and presented from the data obtained through the research instruments. The data presentation starts with the results from the facilitators' questionnaire (Appendix IV), observation schedule, semi-structured interviews for the facilitators and document analysis in a form of narrative cases from each of the eight facilitators. These results produced five themes for discussions. It ends with the students' questionnaire (Appendix V) and focus group interviews for the students which were used for triangulation of data to achieve measures of trustworthiness (Krefting, 1991).

The observation took place at the beginning of each of the eight courses (one for each of the eight facilitators). The facilitators' initial meeting with students were in the form of a workshop which included hands on work on the on-line system. The interviews were conducted with the facilitators after these initial workshops. Further interviews were held with the facilitators, midway and towards the end of the course. Document analysis was an on-going activity during the data production process. The facilitators' questionnaires were also administered to the facilitators, midway and towards the end of the course.

The students' questionnaires were administered to the students attending the courses presented by the facilitators, midway and towards the end of the course. The last interviews were focus group interviews for students to answer

the last critical question (see section 1.3). For students there was no one-to-one interview because the time was limited.

Therefore, this chapter is divided into Section A (findings from facilitators) and Section B (findings from students). The chapter begins with the presentation of the results in the form of stories from each of the facilitators (Section A). The stories produced five themes for discussion. The chapter concludes with an analysis of the data collected from students (Section B) follow thereafter by the five themes with their conclusions.

These findings are presented in the form of descriptions (stories) because stories present first hand information from the participants which are believed to be a true reflection of what the participants believe (Southall, 2001).

# SECTION A

## 4.2 FINDINGS DERIVED FROM THE FACILITATORS' DATA SET

### 4.2.1 The questionnaire for facilitators, Observation, Interview and Document analysis.

The narratives commence with a first person account of how the research participant sees him/herself working within the WBTL context. This first person narrative is followed by a narrative account of the researcher's observations, document analysis and facilitators' questionnaire of their WBTL activities. This section of the findings culminates with a cross-case analysis of the emerging issues and trends grouped into five themes. Therefore, this section responds to the first two critical questions shown in section 1.3 as follows:

a) What are the experiences of Educational Technology facilitators regarding the use of web technologies to promote Web-Based Teaching and Learning (WBTL)?

b) What teaching and learning philosophy informs the design of Web-Based Teaching and Learning (WBTL) environments?

The presentation starts with the facilitators from institution one as they were given names in section 3.2.3.

#### 4.2.1.1 Respondent 1a

Respondent 1a holds a Masters of Science degree in Computer Science as her highest academic qualification. She started her work at one of the universities in South Africa in July of 1988. She is currently employed at INSTITUTION 1 as a senior facilitator in Educational Technology.

> *My first position was titled User Consultant with a specialisation in training. During this time I developed in-house courses for XyWrite III Plus, DOS, VP Planner, dBase III Plus, WordPerfect, Windows and Ms Word for Windows. I also did training on internal systems such as "A guide to the Medical School Local Area Network", and the university […], departmental Student System. During this period I received two merit awards and was promoted to Senior User Consultant,* explained Respondent 1a.

Her account continues as follows:

> *with the development of personal computers in the late 80s and early 90s I became involved with the development and investigation of Computer Based Education (CBE) programs and sat on the Multi-media Research Committee. In this light and with other colleagues we investigated the use of CBE in South African Tertiary Educational Institutions and made recommendations to the University regarding its use and implementation.*
>
> *As the technology developed and the Internet became pervasive my job description changed. I was made responsible for the support of online learning at the University as a member of the Academic Computing section of the Information Technology Department.*
>
> *In the early 2000s the University set up a section called Information Technology in Higher Education, and here my job entailed the*

*support of Academic staff wishing to develop online courses, WebCT Administrator and facilitator of the Online Languages and Human Computer Interface courses which form part of the course work for a postgraduate degree in Digital Media.*

*In 2002 I was offered a two year contract position at the University […], and [my] University graciously allowed me to take a two year leave of absence effective from January 2002 to December 2003. My job title at the University […] was Training Manager in the IT Department. I was responsible for developing and implementing a training plan for the division. This included the development and implementation of a training plan for long-term degree training for citizen staff as well as short term courses, conferences and professional development for all staff in Information Technology Development. I also acted as the technical support for the University's e-learning initiative doing server maintenance (with a great deal of assistance from the networking manager) for the WebCT server, helping the staff with WebCT administration when called upon and was the IT Department's representative on the [University's…] E-Learning committee.*

*On returning [to INSTITUTION 1] I continued with my support and teaching duties along with the supervision of honours and masters research dissertations. The institution had changed its Online Learning Management System from WebCT to a home grown open source application.. I was also made responsible for assisting the Medical School to move its WebCT courses to [INSTITUTION 1] open source. I am also currently involved in the ongoing training of other academic staff members to use the system and I offer support on the system when require*.

Her teaching, learning, philosophy and research interests are as follows:

> *I am familiar with current theories (behaviourism, cognitivism, constructivism with, AT, TLT, ANT, connectivism and engagement theory) related to online learning with a strong leaning towards social constructivism in the virtual learning environment. Social constructivism indicates that when students learn there are other people who are involved that can influence the students' construction of meaning / knowledge / reality. For example, facilitators have a major task in their students' construction of knowledge. Other people involved are other students, technical support staff, administrators, educational technologist, parents and many others. I think I am strong because in my BA and HDE qualifications I was specialising in Psychology and Guidance Counselling respectively where most of these theories come from. I am particularly interested in the use of technology to support different learning styles (behaviourism, cognitivism, constructivism), and in the cultural constructivism issues related to the use of educational technology*. *Cultural constructivism brings in issues of culture that need to be taken into consideration if one needs to teach or learn effectively. This includes the subjects, objects, community and tools as identified by AT as well as other symbolic systems that are useful in terms of facilitating Web learning interaction as indicated by Vosniadou (1996*), said Respondent 1a.

The above account from Respondent 1a suggests that her development of basic knowledge about computer systems and usage was largely facilitated by the context in which she worked. The opportunities were available to her to construct in-house courses and develop training manuals. This context also provided her with the language and skills development needed to further explore and engage in computer aided learning as well as WBTL environments with advanced Web technologies (.e.g. tools used to train facilitators, work as a WebCT & INSTITUTION 1 Window Learning System manager and administrator) and Web theories (social, cultural & communal constructivism).

Further, to the narrative account by the research participant, the following were observed relating to the way she designed and taught students using the WBTL

environment: The data from all the instruments indicate that Respondent 1a is using all the advanced Web technologies as highlighted in the next section (.e.g. computer conferencing software that publishes and plays back the course). She possesses all the relevant frames of references (as identified by White and Weight, 2000) (see Chapter 2) of working as a very strong constructivist learning facilitator as she was encouraging her students to explore their own thinking and knowledge building processes (Biggs, 1995). Respondent 1a was found to be an effective Educational Technology facilitator to facilitate constructivist learning using the advanced Web technologies. Looking at her frames of reference one can see that she has been involved in many different kinds of challenging situations that have helped her to transform from other perspectives to that of becoming a constructivist.

In terms of her design strategy for the Web - she uses the three rings and the three schools of thought (dominated by the constructivist dimension), which is equivalent to the third advanced level of Activity Theory (AT). It also has all the Web tools (technologies) indicated in Appendix VI. Her specific design is shown in Appendix X (p. 177-180) (Respondent 1a's design, Design feature 1 – 4, Chat, Discussion and Design learning tools available). This was also indicated by the results from the two questionnaires (Appendix VII) where her results correspond well with her story (from the other three instruments). The fact that she has been combining different professions to become a strong Educational Technologist to facilitate constructivist learning in using the Web teaching and learning has paid off for her. She has combined English with Psychology (BA), English with Guidance Counselling (HDE) and Computer Science (MSC). She has also published some articles on the WBTL. Respondent 1a uses both the WBTL and face-to-face teaching methods to teach her students.

Respondent 1a does not specify the outcomes of her modules during the time of her presentation, but she only states the aims of the module. The outcomes are only stated in her documents which can only be assimilated by means of document analysis of the instruments or by interviewing her. She believes that if students are given the outcomes they limit themselves to those outcomes even if they could achieve other outcomes that are not specified as a part of the

course. Her presentation starts with ‘introduction’. Her ‘introduction’ consists of ‘welcome’ and ‘general discussion’. Activities consist of ‘problem’, ‘resources’, ‘tasks’ and student support tools (chat, discussion and / or tracker tools) (Appendix X: Respondent 1a’s design, p.176). Most of her tasks for assessment are submitted online using discussion tools.

Therefore her account suggests that her WBTL environment is dominated by constructivist principles as this was also clear from the results of the questionnaires in the next section of this Chapter 4. The Majority of students felt that their activities have all the characteristics of constructivist learning as identified by Herrington, Reeves and Oliver (2004).

#### 4.2.1.2 Respondent 1b

Respondent 1b’s highest qualification is a Masters of Education (MEd) in Educational Technology. His MEd research project was on the use of resource centres in teaching and learning. His previous qualifications indicate that he did English and resource centre management as his major subjects.

Respondent 1b explained,

> *I am currently studying towards my PhD in Higher Education in South Africa, because I want to move away from Educational Technology field of study to deal with higher education issues. To tell you the truth I am no longer interested in ET because of the high tech that keeps on reshaping the field. I am old enough to take my pension now instead of attending courses that have to do with high tech in teaching and learning. Joining Higher Education will make me comfortable to use the knowledge and skills that I have now instead of attending training in the field of ET with rapidly changing and challenging technologies. I am not good in using these Web technologies in teaching and learning, but I am very strong in using search engines and blog sites in teaching and learning as well as working as a constructivist. For me to be able to use these I was helped by my friend from USA, but it took me almost three years to*

*understand it. I am not prepared to go through another process of learning something new at my age. This means I have to learn how to design web sites and use the [LMS] with many different tools. […] I am not prepared to do that. But I know that working as a constructivist I will find my new home in the field of Higher Education as I have already started to work with this field of study to facilitate few modules*'. *I like the constructivist approach because it involves students' previous experience and it also helps facilitators to grow using students' contributions during the time of interaction.*

Respondent 1b's account continues as follows:

*We do not have enough Educational Technologists in South Africa because the field is being undermined as if it is for technicians not professionals. Most of our university managers think that Educational Technology is the same as Computer Science or Technology Education. Such misconceptions lead to a situation where everyone from these two fields ends up serving as an internal or external examiner for Educational Technology students. Most of these examiners from Computer Science and Technology Education or Media studies sometimes use positivist approach while our students use interpretive approach. This has been a problem for most of my students where one of my students was given fail by an internal examiner (new Doctor) from Computer Science and a distinction by an external examiner (senior Professor) from Educational Technology. There are many other cases that I can show you but this does not help me anymore because I am leaving the field to join one of the most respectful fields (Higher Education) or I have to take my pension. I can't publish because I cannot even manage my workload because this university has been searching for qualified Educational Technologists since 2003 to fill the existing vacant positions. Therefore, we are carrying other peoples' workload because the university is unsuccessful in trying to fill these positions.*

The above account from Respondent 1b suggests that he has developed a negative attitude towards the use of Web technologies because of the context he worked in. This context continually changed through innovation, making this field of work highly engaging with constant updating of knowledge and skills. His age also contributed to this feeling as he felt that this constant growth in the IT field was and is too demanding. The issue emerging from this narrative suggests that there should be some stability to allow for usability of systems and processes rather than upgrading and re-training.

Respondent 1b's account also suggests that there is a shortage of Educational Technologists is South Africa because the field is not given equal status with other field of studies. If this is true it will mean that South Africa will still lose more Educational Technologists to other fields of studies.

Another issue of concern according to him has to do with the workload which he cannot manage because there is a shortage of Educational Technologists in South Africa. One facilitator carries workloads for other facilitators because his / her university has some vacant posts.

Through the observations and a review of the documents it was found that:
In terms of his design for WBTL, he uses the easiest ring of the three rings and operates at first level of Activity Theory because of his frames of reference (White and Weight, 2000) which in most cases, for Web facilitators, are different from the ones that are mentioned in Chapter 2. Respondent 1b prepares different projects for his students and gives them a list of search engines to be used in order to complete these projects. He also uses emails and blog sites (Appendix X: Respondent 1b's Design, p.183) to communicate with his students. In terms of assessment he uses both group and individual assessment strategies which are not based on the Web in most cases. The only Web assessment strategy he applies is when he asks his students to comment on the blog site or send an email with PowerPoint for presentation. But, he has all the personal qualities (White & Weight, 2000) required to facilitate the Web learning for constructivists as one component of the frames of reference (as indicated in Chapter 2). The results from the questionnaires below also indicate

that he is using the easiest ring only as he indicated that he cannot use most of the tools (technologies) indicated in Chapter 2 (White, 1999).

He starts his presentation by emailing his PowerPoint presentation (not animated because he does not know how to animate a presentation) to all his students before they come to meet him. His presentation consists of his 'contact details'; 'outcomes'; 'dates & time for contact sessions'; 'topics to be covered'; 'projects for his students'; 'list of different search engines'; 'assessment criteria' and 'module evaluation'. When he meets his students he introduces them to his blog (blogging) site (Appendix X: Respondent 1b's design, p.183).

This account suggests that Respondent 1b resorted to using the easiest ring of the three rings and operating in the first level of AT. With the fast changing nature of the field he is not able to cope with innovations. He does not cope with different Learning Management Systems (LMS) (easier ring of the three) used by universities in South Africa which are much easier than designing a new web site (third ring of the three).

#### 4.2.1.3 Respondent 2a

Respondent 2a holds two Masters of Education degrees, one in Educational Psychology and the other in Higher Education Practice. She is studying towards her PhD in using the WBTL (Barriers to effective educational delivery WBTL: quality, access and delivery in technology-enhanced learning). Respondent 2a indicated that as part of her Masters degree she had to acquire more knowledge and skills in the following areas: 'Higher Education Practice; Assessment in Higher Education; Mentoring in Higher Education; Curriculum Design & Development in Higher Education; Research Methodology in Education; Learning Materials Development and Design'. She said,

> *I consider these areas as one of the most important areas to be combined with English and Educational Psychology to produce a well equipped Educational Technology facilitator to facilitate WBTL for constructivists*.

She has also been working as a senior facilitator in Educational Technology at INSTITUTION 2 since 1998:

> *Before I joined this institution (1971-1997) my previous experience includes teaching, academic software development and marketing; training; multi-media courseware development and community development work*.

With regard to her current duties, she had this to say,

> *My current duties include the following: Development and maintenance of online learning technical systems at [INSTITUTION 2]; development; support and training of facilitators; design and delivery of workshops and of the online learning programme for staff; and research in the field of online learning, particularly in Web-based teaching and learning*.

Through the analysis of this narrative, knowledge is being privileged as important in WBTL. She is quite clear that to have knowledge of ICT is not sufficient in promoting WBTL. One needs to have a sound knowledge of the higher education environment (i.e. about higher education curriculum activities and processes), a sound knowledge of communication and a sound knowledge of learning. All three are important in the process of designing and implementing a Web-Based Teaching and Learning environment.

Through the observations and a review of the documents it was found that:
In terms of her design for WBTL she was using the easier ring (LMS) of the three rings, which is equivalent to the second level of Activity Theory (AT). She was limited in using the third ring (design web site for teaching), as she was working with her technician all the time. She indicated that she believed that she was using constructivist approach in her WBTL, but it was observed that she was not aware that she was also using the other two schools of thought (behaviourism and cognitivism) as well. This became clear to the researcher that Respondent 2a was using behaviourism as she was observed spoon feeding her students (asking them to follow her on what she was doing on the

screen). Even her PowerPoint assessment criteria (Appendix XI) did not give her students an opportunity to be creative because it was too structured for constructivist learning. For example if other slides were not meant to have a picture according to her students' story-boards they would be forced to include at least one unnecessary picture to be animated according to her criterion for marking.

However, her design included an action research component for her students in approaching their ET projects which gave her students an opportunity to work on their own (group and individual projects). Although she was not using all the advanced Web tools (technologies) in her design she was aware of them, because she was working hard to use the frames of reference (White & Weight, 2000) used by ET facilitators to facilitate Web learning for constructivists. Her specific design is indicated in Appendix X (Respondent 2a's Design, Design features 1 – 4, Resources, Chat, Discussion and some of the tools shown in learning tools available, p.184-186). It consists of 'information', 'projects', 'resources', 'student support', 'assessment' and 'evaluation'.

She starts her presentation by means of PowerPoint before she uses the online presentation. The same information that is presented by the PowerPoint software is then presented online as well by using the above mentioned issues taken from Appendix X: Respondent 2a's design. In addition to this she gives her students some handouts.

Analysis of Respondent 2a's account suggests that she is aware of different activities that one needs to understand in order to promote WBTL environment (e.g. communication, learning theories generated from Educational Psychology and higher education activities). It also suggests that she uses behaviourism with constructivism principles and operates at the second and third level (i.e. she has experience in WBTL environment) of Activity Theory because of her awareness of other activities that need to be considered in order to promote WBTL environment.

#### 4.2.1.4 Respondent 2b

Respondent 2b holds a Masters of Science degree in Information Technology. Through the observations and a review of the documents it was found that:
His terms of reference are indicating that they were developed by his involvement with courses like Information systems, data communication, computer science and others; but he did not have much time for the interview as he kept on emphasising that he had many things to do. But, he did allow the researcher to observe and he also responded to the two questionnaires positively.

His design was similar to that of his colleague Respondent 2a although he was more advanced than Respondent 2a in terms of using the three rings. It was easy for him to design the websites, but he was weaker than Respondent 2a and Respondent 1a in terms of using the Web tools available as indicated in Appendix X: Design Learning Tools. He started to use the LMS in the past two years but in terms of designing websites he has been doing this for the last ten years. Analysis indicates that he does possess the personal qualities for Web facilitators as explained in detail in Chapter 2 section 2.3.

He begins his presentations by first giving his students handouts that explain the whole module. He uses handouts more than online tools to enable his students to complete their tasks. In some cases it was observed that his design was full of content for his students rather than resources or references. In short he was observed, in some cases, spoon feeding his students.

This above analysis from Respondent 2b suggests that he relies more on technical elements, especially that of designing web sites (third ring, which needs more technical knowledge and skills), to present the content of his modules to students. He has limited time for his university LMS (easier ring of the three). He has a lot of experience in designing web sites, but he is weak in designing and implementing WBTL environment as it needs to be underpinned by teaching and learning theories (McNaught, 2003).

When he was asked why his WBTL environment was full of content, Respondent 2b explained:

> *I can't teach without giving my students the notes because the notes help me to achieve the intended outcomes faster. If I allow my students to use different sources of information it becomes difficult, even impossible, for me to achieve the intended outcomes. Time is another factor that one needs to consider in teaching any module. It becomes impossible in most cases to finish the module on time if you allow your students to search for information, but if you give them notes on your web and handouts it is easy to finish the module on time*.

In terms of space on his university server he said,

> *I am not worried about the space because our server is big enough to carry about one hundred books of about two hundred pages each. I am aware of constructivist approach but I cannot apply it because I have limited time for all the modules that I am teaching*.

The above account from Respondent 2b suggests that he believes in behaviourism principles as his students also felt that their activities have limited characteristics of constructivism principles (from questionnaire's responses). He uses his web site and himself as the source of information (content). He uses time as his reason for not learning how to combine his computer (web site design) knowledge and skills with teaching and learning theories that can underpin his web sites in order to be transformed to the WBTL environment.

#### 4.2.1.5 Respondent 3a

Respondent 3a obtained her PhD degree in 1999 where she was investigating the 'application of educational computer games in Educational Technology teaching'. Her areas of expertise are technology in Higher Education, ICT bridging the digital divide, e-learning and Business Information Systems.

Before 1995 she started working as a High School and a Primary School teacher. In 1995 she was appointed as a facilitator in End–User Computing on Computer–Assisted Education (as a part of Educational Technology) at University of […]. In 2000 to 2005 she was appointed as a head of End–User computing and as a senior facilitator in the Department of Software Development at her university.

> *'Currently I am the Head of Research in the ICT faculty. In this capacity I have to support and strengthen all research activities, work together in research teams and transform certain research teams where necessary. I am also the Research focus leader of our Faculty with 4 Niche areas. I am Chairperson of the Faculty Research Committee and represent the Faculty at the Central Research Committee. Currently we have […] students at Masters and Doctoral level in the Faculty of ICT development sessions related to research and have initiated the development of a website for research and development for the Faculty of ICT where students can also monitor their progress.'* said Respondent 3a.

> *'I was also the Chairperson of the Faculty Quality Committee (QIT) 2004-2005 where I coordinated all quality related aspects in the Faculty at […] different campuses where we offer ICT courses. I have also initiated the development of a website for QIT for the Faculty of ICT. [I] have managed to arrange two successful quality peer reviews between 2004 and 2005 for the Faculty of ICT. I am involved with NEPAD in this project where we provide e-learning to rural schools and monitor the quality of the process at rural schools and communities for 2004 and 2005. I am also involved with the MRC (Medical Research Council) and the University […] in a telemedicine project for rural communities. With regards to teaching philosophy, although I respect other theories, I believe strongly in critical constructivism as a teaching philosophy for WBTL. I believe in critical constructivism because students should be critical in their thinking in order to use the Web in learning*.'

The above account from Respondent 3a suggests that she had gained her knowledge and skills of implementing and promoting WBTL through power as explained in Theme 1 of Table 4.1. She has been representing her university in different committees (NEPAD and MRC) where she has been gaining knowledge and skills in WBTL. One of the theories she has been applying is critical constructivism.

Through the observations and a review of the documents it was found that:
Although Respondent 3a has been using WebCT she has moved to the new Learning Management System (LMS) which was developed by her university in the last few years (Appendix VII). Respondent 3a enjoys the use of this LMS because it has the same features as that of the other above mentioned participants (Respondent 1a, 2a and 2b) as shown in Appendix X. She uses the three rings comfortably as she is operating at the last advanced level of Activity Theory because she has been involved in different projects that have strengthened her frames of reference as indicated above. The researcher failed to copy and save her design sample because the researcher was not given permission to do so. However, the researcher managed to observe it and save the main picture of their design as shown in Appendix X as Respondent 3a & Respondent 3b's main picture of design. The results from the questionnaire below indicate that she has almost all the personal qualities of the Web facilitator as indicated in Chapter 2. Most of her many publications are on the WBTL.

Her designs share the same elements with the above mentioned facilitators, because it also starts with the 'introduction', 'outcomes', 'projects', 'assessment criteria' and 'evaluation'.

Respondent 3a's above account suggests that power (being in a higher position at work) offered an opportunity to gain knowledge and skill in using the advanced WBTL tools (e.g. software that play back the course) in order to operate at the most advanced level of AT. Respondent 3a was able to use all the three rings of TTTR theory as discussed in chapter 2 and 6.

#### 4.2.1.6 Respondent 3b

Respondent 3b has a Doctor of Education (DEd) degree in Computer-Based Education as a part of Educational Technology.

Before he joined his university in 2002 he was working as a high school teacher for Biology and English. In 2002, he was appointed by his current university as a senior facilitator in Computer–Integrated Education which is a part of Educational Technology discipline. He explained,

> *'I have been involved in the teaching of the following modules*: *Teaching: Uniprep Foundation: Basic Computer Skill, Teaching Studies A: Basic Computer Skills, ABET: Basic Computer Skills (Beginners), ABET: Basic Computer Skills (Third year students), ACE: Educational Computing – Computer-Integrated Education, ACE: Educational Computing – Educational Multimedia Development, ACE: Educational Computing Skills, BEd: Computer Skills for Educators, BEd (Hons): Development of Web-based instruction, BEd (Hons): Educational Computing foundations, BEd (Hons): Development of Multimedia instruction, MEd: Coursework and supervision (Computer-based education), PhD: Supervision (Computer-based education)*.'

Respondent 3b's above account suggests that he had opportunity to gain advanced WBTL knowledge and skills through the nature of his job as it involved Web-based instruction at Honours level. His place of employment also gave him an opportunity to explore further WBTL knowledge and skills by teaching and supervising MED and DED students.

In both his Masters and Doctor of Education degrees he was designing and developing Web courses or evaluating Web learning programmes. These courses were based on constructivist learning. He indicated that in his teaching he cannot live without the constructivists' approach. He also used different types of assessment strategies and projects that have almost all the characteristics of constructivist learning as identified by Herrington, Reeves and Oliver (2004) (as shown in Appendix V). These include tests, assignments and

peer assessments. His Further Diploma in Education (FED) was in Guidance (after his Secondary Teacher's Diploma). His Web design consists of advanced tools of the three rings and the third advanced level of AT. He has a lot of experience in using the three rings even in his university LMS. He also has all the personal qualities for the Web facilitator as indicated in Chapter 2. He used all the tools indicated in Figure 2.4, Appendix VI and Appendix X because of his experience in terms of working Online.

His WBTL environment had 'introduction', 'outcomes', 'projects' 'assessment tools' and 'evaluation tools' (using chat and discussion tools).

Respondent 3b's analysis above suggests that he is aware of constructivism as one of the theories that underpin WBTL environment. His qualifications and the nature of his employment have helped him to use the three rings and operate at the advanced level of AT in designing WBTL.

#### 4.2.1.7 Respondent 4a

Respondent 4a believed that she had the following personal qualities as part of her frames of reference in addition to the ones that were mentioned in Chapter 2 for this study: highly organised; strong interpersonal focus; professional; energetic; team player; highly motivated; self disciplined; good interpersonal skills and the ability to work under pressure.

Respondent 4a started working as a secondary teacher and district officer for the Department of Education from 1985 to 2002. She said,

> *'my main duties involved teaching accounting, business economics, computer literacy, acting head of department; planning; organising; leading; controlling; budget, improving interpersonal human relations; compiling reports, etc*.'

Respondent 4a is currently working as an ET instructional designer at INSTITUTION 4. She has a Doctor of Education degree in Computer-Based Education. She summarised her key competencies as follows:

*'I analyse, design, develop and evaluate curricula and learning environments together with experiences. I undertake continuing professional learning, monitor processes with procedures, conduct ODL scholarship and research, undertake academic (institutional and community) citizenship, have experience in WebCT, Authorware and MS Front Page; conduct workshops and train facilitators in courseware development, storyboarding for paper-based and ICT platform and online courses*.'

She continues…

*'my MED and BEDH qualifications include the following areas: programming-Authorware package system; designing and development of online courses materials; MS Front Page 2000: - editor and html; instructional design system; introduction to Web CT; integrating multimedia in the curriculum; virtual classroom: e-learning component; research development; research methodology; adult basic education and training; educational perspectives; multicultural education; curriculum development; critical and creative thinking development; technology education; information technology in education (internet, web pages, etc.); media science; computer skills; computer educational management information system as well as computer application software*.'

The above account from Respondent 4a suggests that her development of basic knowledge about WBTL was largely facilitated by her training (DED, MED and BEDH) and the context that she worked in. The opportunities were available to her to learn, use WebCT and train other facilitators. This context also provided her with knowledge and skills in applying systems approach in her WBTL environment (i.e. she plans, organises, analyses, designs, develops and evaluates curricula and learning environments together with experiences).

Through the observations and a review of the documents it was found that:

In terms of her design of WBTL she used the three rings and the three schools of thought dominated by constructivism. She said, '*I also use systems approach because it is easy to follow if I want to improve any web learning situation*'. She uses advanced tools (technologies) in her design, because of the above mentioned frames of reference. Even her AT level of operation is the advanced level three as the results from the questionnaires testify.

Unfortunately, the researcher did not get any access to her learning system but it was observed as indicated above. She did not give the researcher permission to copy and save it on a portable diskette for references. It was again observed, she started her design with 'outcomes', 'teaching / learning strategies', 'projects', 'assessment strategies' and 'evaluation'. She also uses knowledge management, performance support and collaboration as her online teaching strategies.

The above analysis from Respondent 4a suggests that she had opportunity, through her place of employment and the context in which she worked, to get relevant training, experiential knowledge and technical skills of promoting WBTL.

#### 4.2.1.8 Respondent 4b

Respondent 4b has a Doctoral degree in Educational Technology where his specific area was on the WBTL and Distance Education. Before 2002, he first worked as a High school teacher of Geography and later in the 1990s he joined one of the universities in South Africa where he was working as one of the Educational Technology specialists for the institution.

The researcher had to present Respondent 4b's narrative mainly as a third person with a few lines as a first person; because he did not have time for the interview most of the findings from him were collected by means of observation, document analysis and questionnaires. He agreed to be a part of the study but later he indicated that he was not prepared to be interviewed and he reserved his reasons for that.

In 2002 he joined INSTITUTION 4 to continue with his Educational Technology work together with curriculum issues for his new institution. He has been involved in Web learning since 2000. His design, which is similar to the one that is shown in Appendix X (Respondent 4b's design), is influenced by the three schools of thought together with systems approach. He does not believe in one school of thought only as he said,

> *'I currently lean towards a transformative philosophy underpinned by constructivism and post modernism as they also underpin my DED study. However there is always room for behaviourism in my philosophy as I believe that no one philosophy has the answers to the paradigms and scope of teaching and learning*.'

He uses his university LMS called EINSTITUTION 4, which is not the one that is indicated in Appendix X, as an open learning system. He is operating at the last advanced level of AT and he can use all the three rings in his design, because he has been attending different kinds of courses on Web learning (including WebCT, BlackBoard, Atutor and Sakai with EINSTITUTION 4) (Appendix VII). Although the observed design did not reflect most of the advanced Web tools, and the limited interview questions he answered, it was evident that he can use most of the advanced Web tools. He also has most of the personal qualities for the Web facilitators indicated in Chapter 2 section 2.3.

He begins his presentation (design) with 'welcome', 'outcomes', 'assessment', 'module schedule or welcome', 'teaching & learning approach', 'reading resources', 'assessment tasks', 'portfolio', 'news', 'course evaluation' and 'lecture one to lecture …' (as shown in Appendix X: Respondent 4b's design, 187-189). His reading resources include a course not compiled by him using different sources for his students to read.

The above account from Respondent 4b suggests that he had opportunity, through his place of employment, to gain knowledge and skills to promote WBTL (i.e. he attended short courses on WBTL). He did not have any computer

qualifications before he was employed by his first university. For him to understand the theories that underpin WBTL he had to include them as a small portion of his DED degree.

## 4.2.2 Cross case analysis (Five Themes)

**Table 4.1**: Facilitators' experiences, teaching and learning philosophy for WBTL (Key question A & B)

| THEMES | CATEGORIES |
|---|---|
| **THEME 1**: Source of knowledge | • Academic Qualification<br>• Context<br>• Opportunity through employment<br>• Power |
| **THEME 2**: Learning with tools | • Advancement of ICT in Institutions<br>• Course resources<br>• Level of Interaction |
| **THEME 3**: Theories underpin WBTL environment | Teaching and learning theories |
| **THEME 4**: Keeping the language of the field going | • Publications<br>• Work load |
| **THEME 5**: Connecting the field with other fields | • Exposure to different fields |

Categories of findings are presented under each theme mostly by means of direct quotations and substantiated with discussions to re-contextualise them with relevant literature to respond to the first two key questions (A & B) for this study as indicated above.

### 4.2.2.1 THEME 1: Source of knowledge

**Academic Qualification**

All the eight facilitators have at least a Masters degree in Computer Science or Education. Others even have PhD or D.ED over and above their Masters degree. The majority of them studied Educational Psychology, English and

Computer related education as part of their qualifications. Respondent 2a indicated for example that as a part of her Masters degree she had to acquire more knowledge and skills in the following areas: 'Higher Education Practice; Assessment in Higher Education; Mentoring in Higher Education; Curriculum Design and Development in Higher Education; Research Methodology in Education; Learning Materials Development and Design'. She said

> '*I consider these areas as one of the most important areas to be combined with English and Educational Psychology to produce a well-equipped Educational Technology facilitator to facilitate WBTL for constructivists.*'

The results suggest that in order to manage successfully in Educational Technology, one needs to study English, Educational Psychology and Computer related studies. This suggestion is clear if one looks at Respondent 1a's words (she has a Masters degree in Computer Science) which were supported by most of the eight facilitators as follows:

> *'I think I am strong because in my BA and HDE qualifications I was specialising in Psychology and Guidance Counselling respectively where most of these theories come from…'*

Respondent 1b did not have much knowledge and skills in Computer as a result he was not successful in using WBTL environment. Respondent 1b said,

> '*I am currently studying towards my PhD in Higher Education in South Africa, because I want to move away from Educational Technology field of study to deal with higher education issues…'*

Therefore, knowledge of Educational Technology, knowledge of Higher Education, knowledge of educational theories, subject based knowledge and knowledge of communication technologies become the kind of knowledge that would allow for successful WBTL usage.

**Context**

It was found that the context in which one is operating plays an important role in promoting good frames of reference that assist WBTL participants to operate

successfully. Respondent 1a's account serves as a good example to indicate this,

> *My first position was titled User Consultant with a specialisation in training. During this time I developed in-house courses for XyWrite III Plus, DOS, VP Planner, dBase III Plus, WordPerfect, Windows and Ms Word for Windows.*

She suggests that her development of basic knowledge about computer systems and usage was largely facilitated by the context that she worked in. The opportunities were available to her to construct in-house courses and develop training manuals. This context also provided her with the language and skills development to further explore and engage in computer aided learning, as well as WBTL environment, with advanced Web technologies (.e.g. tools used to train facilitators, work as a WebCT & INSTITUTION 1 Window Learning System manager and administrator) and Web theories (social, cultural & communal constructivism). Other facilitators were also influenced by their context.

The results also reveal that one can start working as a High School teacher and change to university education as some of these eight facilitators did. Looking at their account it is clear that for them to work as high school teachers contributed towards their success of becoming Educational Technologists. They revealed their experience of working as high school teachers because they were proud of their experiences and where they had come from and what they had progressed to.

Therefore, facilitating context (experience) tends to allow for greater depth in using WBTL.

**Opportunity through employment**

Opportunity through facilitators' employment came out from the data for this study as one of the most important elements of acquiring knowledge and skills in the use of the WBTL environment. Most of these facilitators were given the

opportunity to develop WBTL environment because of the nature of their job as Educational Technologists. Looking at their qualifications, most of them were employed with WBTL knowledge and skills that were then facilitated by the course that they taught. If one looks at most accounts from these facilitators, one realises that most of them were involved at different levels of computer related courses in their teaching, research projects or qualifications. Respondent 1a even revealed this opportunity in her account above:

This indicates that even if someone has not specialised in ET, s/he can become an Educational Technologist provided; s/he is given the opportunity at work to learn.

**Power**

Other facilitators, according to the results for this study, have acquired knowledge and skills in WBTL environment because they have power at their universities. Their power helps them to influence their university decisions on the implementation of advanced ICT. Respondent 3a's case serves as an example for this because she has been representing her university in different ICT committees and is also head of the ICT faculty.

> *'Currently I am the Head of Research in the ICT faculty. In this capacity I have to support and strengthen all research activities, work together in research teams and transform certain research teams where necessary…'*

The facilitators' experiences indicate that they are learning from diversity of opinions (Siemans, 2005). Therefore, there are many sources that one can use in order to become an Educational Technologist, especially in South Africa, where there is no formal undergraduate qualification for Educational Technologist. Educational Technologists become a product of different field of studies and their work experience.

**4.2.2.2 THEME 2:** Learning with tools

**Advancement of ICT in institutions**

Advancement of universities in Information and Communication Technology (ICT) has been identified in this study as one of the powerful forces that influence the field of Educational Technology (ET). As a consequence of the fact that older facilitators are not comfortable with this advancement Respondent 1b's account is a good example for this because he has even indicated that he is old enough to get his pension or leave the field of Educational Technology and join Higher education. On the other hand, other facilitators enjoy being in this field because they are operating using computer knowledge and skills which they acquired as parts of their experiences. Most of them had relevant knowledge and skills to accommodate even advanced technology which makes it possible for their learners to learn without facilitators' present.

**Course resources**

Other WBTL environments for the facilitators did not have resources but had course notes instead. Respondent 2b, for example was using WBTL environment for course notes: '*I can't teach without giving my students the notes because the notes help me to achieve the intended outcomes faster…'* Some of those resources were online, although he reproduced them for the WBTL environment instead of linking them. This method of reproducing resources in order to be published on the WBTL environment is one of the elements that may promote the act of plagiarism. Students may end up imitating facilitators and practise it when they design their new web sites. It also takes a lot of unnecessary space on the server. This practice should be avoided by linking all the online resources if it has to help students for the digital age. However, most of these facilitators did use the linking methods.

Therefore, course notes tend to facilitate an instrumental (full of restricting instructions) approach in WBTL environment as students end up concentrating on the course notes and ignore other important sources.

**Levels of interaction**

This study revealed that most of the facilitators had knowledge of involving their students in all four levels of interactions as identified by Moore (1989) as well as Hillman, Willis and Gunawardena (1994). Student-interaction is important for students to master before they begin student-content interaction. Learners need to master this level in order to deal with contents of their subjects effectively. Moore (2002) argues that if students want to fully benefit from WBTL they must be self-motivated and be in full control of Web technologies. Garrison (1990) claims that students who have better learning experience are those that mostly appreciate student-student and student-instructor interactions. Respondent 1b and Respondent 2b were limited in promoting student-interface and student-student interaction because their methods of teaching indicated that they wanted easy ways to finish their modules. They even use handouts (hard copies) in their teaching.

Well planned, organised and designed WBTL environment indicates that learning with tools is possible. Siemans (2005) argues teaching and learning is not only for human but even non-human resources can also facilitate the process successfully for students to learn. As a result these facilitators use WBTL tools (chat, discussion, etc) to facilitate the different level of interactions in their teaching or learning processes.

**4.2.2.3 THEME 3**: Theories underpin WBTL environment

**Teaching and learning theories**

Constructivism was a common theory that all facilitators (except Respondent 2b) recommended in their WBTL. Respondent 1a went further to specify and define constructivism in relation to social constructivism (as indicated in her account above). It was interesting to find that they were using both components of Educational Technology (TIE and TOE) in terms of their design of their WBTL environments. Although Respondent 2b did not believe in constructivism, he did have certain projects that have most of the characteristics of constructivist approach as identified by Herrington, Reeves and Oliver (2004).

Systems approach was found to be one of the useful approaches in some of the courses. While others rejected it because of the behaviourism elements, Respondent 4a strongly believes in it: '*I analyse, design, develop and evaluate curricula and learning environments together with experiences* (using Systems approach)'. One of the reasons for other facilitators to deny that they use systems approach is that it a person needs to be well trained in a linear fashion of step-by-step fashion (Romiszowski, 2004). Respondent 4a enjoyed the system because she had been specifically trained in WBTL. Other theories which were promoted by these facilitators were Transformative Learning Theory (TLT), Actor Network Theory (ANT), connectivism, engagement theory and Activity Theory (AT).

**4.2.2.4 THEME 4**: Keeping the language of the field going

**Publications**

Most of the eight facilitators indicated that they publish articles in this field in order to get connected to other facilitators in the field. They are involved in different research projects because they believe that publications and research projects enable them to be connected to the world all the time and allow them to further develop. This is clear if one looks at Respondent 3a's account together with Respondent 4a's account above especially the following statement:

> *'In connecting myself to the world all the time I undertake Continuing Professional Learning, monitor processes with procedures, Conduct ODL Scholarship and Research…' (Respondent 3a & 4a).*

Most of these facilitators are also members of other professional organisations in the field which facilitates their connection to other experts in the field. Respondent 1b indicated that he was helped by his USA friend who taught him how to use blogs and search engines in teaching (as shown in his account above).

However, Respondent 1b's experience is different from the other seven facilitators because he revealed that if one is working as an Educational Technologist one does not get enough respect from other fields of studies (*We*

*do not have enough Educational Technologists in South Africa because the field is being undermined as if it is for technicians not professionals…)*

**Workload and ET status**

Workload and ET status came up as other challenges that are being experienced by facilitators in ET. In Respondent 1b's account:

> '*I can't publish because I cannot even manage my workload because this university has been searching for qualified Educational Technologists since 2003 to fill the existing vacant positions…*'

Others revealed that they manage, even if they are understaffed, because they are in powerful positions in their institutions. Therefore, they delegate most of their activities to their Masters and Doctoral students. Others indicated that they don't believe that Educational Technology is being undermined because their promotions to their new higher positions were facilitated mostly by their specialisation (Educational Technology). They felt that the field has the highest possible status, like all other powerful field of studies.

**4.2.2.5 THEME 5**: Connecting the field with other fields

**Exposure to different fields**

The eight facilitators felt that to have qualifications in Computer Science and Educational Psychology served as a good ingredient for studying Educational Technology. They felt this way because WBTL is driven by computer technology and theories that mostly come from Educational Psychology. It was not a coincidence that they became facilitators in Educational Technology after they studied other modules in different fields of studies. Instead, Respondent 2a indicated that, as a part of her Masters degree, she had to acquire more knowledge and skills in the following areas: 'higher education practice; assessment in higher education; mentoring in higher education; curriculum design & development in higher education; research methodology in education; learning materials development and design.

> *'I consider these areas as [some] of the most important areas to be combined with English and Educational Psychology to produce a well*

*equipped Educational Technology facilitator to facilitate WBTL for constructivists*…'

**Conclusion of the five Themes**

In conclusion, when assessing the question of, "who teaches Educational Technology to promote WBTL in South African Higher Education (taking from their experiences)?" The answer should be 'I, the digital immigrant'. These facilitators are not getting formal training in terms of the WBTL environment but they draw from their own experiences which seem to be challenged by the new WBTL technologies. Therefore, it is safer to call them digital immigrants in the absence of formal WBTL training. This situation is narrowing the field if the facilitators are being discouraged from remaining. But, if the WBTL training can be planned for the new young facilitators who are used to the new technologies the field can grow and South Africa can have enough Educational Technologists. The field should start from undergraduate courses in order to overcome the shortage of Educational Technology facilitators in South Africa and motivate those who are in the field with enough support.

Bonk (2001), reveals that facilitators are in need of: pedagogical tools; monitoring; WBTL guideline or advice; experts answers to problems; and communities of their WBTL. The same situation was clear in this study as there was no formal training to help these facilitators in terms of pedagogical tools. This means they should master Salmon's (2003) five steps (as discussed in Chapter 2) of the WBTL environment. In order to master these five steps they should be able to use the three schools of thought (Oliver & Herrington 2001) which becomes difficult in the absence of clear guidelines that are mostly acquired from formal training.

Another serious concern is that everyone can mark Educational Technology research search projects. Most of these facilitators felt strongly that this situation is discouraging. This is especially true for Respondent 1b who even indicated some serious problems that were caused by this. The solution to this could be considered by at least involving two external examiners in the case where there is no Educational Technologist to serve as internal examiners.

Finally, with enough qualified Educational Technologists, South African can introduce electronic-Universities to speed up the Government's 2013 target that every learner be Information and Communication Technology literate (Asmal, 2003).

# SECTION B

## 4.3 QUESTIONNAIRE AND FOCUS GROUPS FOR THE STUDENTS

This section of the analysis focuses on the students' experiences of the Web-Based Teaching and Learning. The main source of information was obtained through questionnaires that were administered during their course of their training. Further, this section of the analysis has been informed by a focus group interview with the students, held once at each institution. The analysis picked up on issues that highlighted some of the facilitators' claims about Web-Based Teaching and Learning, as well as issues that were noteworthy in terms of students' experience of Web-Based Teaching and Learning. The section begins by presenting Table 4.2 to show how the majority of students felt about the characteristics of the facilitators' courses in learning. This section then continues by discussing the results of both the questionnaire and focus group interviews.

Table 4.2 summarises the students rating of their experiences of WBTL in their respective institutions. This table attempts to triangulate the responses from the facilitators regarding the context they set up for teaching WBTL courses. The responses, in general suggest that the facilitators provided an enabling environment to promote WBTL, which are in line with activity theory and constructivist theory. For example, activity theory demands that the learning experience of students must include clear outcome statements and student activities as central to learning. The responses from students (as evident from Table 4.2) suggest that most students *agreed* to *strongly agreed* that outcome statements were clear and explicit. Further, they (students) *agreed* to *strongly agreed* that their learning experience on WBTL were enriched with learning activities. From a constructivist perspective, the students claim that their facilitators provided a learning environment that allowed them to construct their own learning based on a clear conceptual map, information rich environment and their own current knowledge.

**Table 4.2**: Students experience of learning within web-based teaching and learning environment

| **Item: CHARACTERISTICS of the facilitators' WBTL courses according to the majority of students** | Strongly Disagree | Disagree | Not Sure | Agree | Strongly Agree |
|---|---|---|---|---|---|
| 1. They have real-world relevance with assessment strategies that included problem-based, project-based, inquiry-based, task-based, case-based and role-playing. | | 1 | | 20 | 19 |
| 2. They start with the explicit outcomes of WBTL courses. | | 5 | | 21 | 14 |
| 3. They start with pre-learning statements or questions before the actual learning takes place. | | 2 | 1 | 28 | 9 |
| 4. They provide conceptual models or concepts maps. | | 3 | | 28 | 9 |
| 5. They have information presented in chunks. | | 3 | | 27 | 10 |
| 6. They have important information placed in the centre of the screen for learners to read from left to right. | | 3 | | 28 | 9 |
| 7. They have information critical for learning highlighted. | | 2 | 1 | 28 | 9 |
| 8. They have learning materials that include activities for the different learning styles as they have linked resources and course notes. | | 6 | 1 | 30 | 3 |
| 9. They encourage learners to construct their own knowledge rather than accepting that given by the facilitator / instructor. | | 3 | 4 | 27 | 6 |
| 10. They are ill defined, requiring learners to define the tasks and subtasks needed to complete the activity | 15 | 20 | | 2 | 3 |
| 11. They comprise complex activities to be investigated by learners over a sustained period of time | 5 | 25 | | 4 | 1 |
| 12. They provide the opportunity for learners to examine the task from different perspectives using a variety of resources | 4 | 21 | | 3 | 2 |
| 13. They provide the opportunity to collaborate (Collaborative and cooperative learning). | | | | 32 | 8 |
| 14. They are integrated and applied across different subject areas and extend beyond domain-specific outcomes | | | | 30 | 10 |

### 4.3.1 WBTL courses for students had real-world relevance

From the focus group interview it has been established that all students have initial Bachelor's qualifications (post-graduate students) and that all are professional teachers. This is important to note because the assumption made here is that all students do have a disciplinary based understanding and have an educational background which implies that they are competent in facilitating teaching and learning within an established discipline.

The majority of them, as it was established through the questionnaire (see Table 1: item 1), felt that most of what they were learning from these facilitators (including Web technologies) was important in their teaching environment. Furthermore it was established through the focus group interview that most of the projects given to them were challenging but they felt that they had almost all important elements of what they were doing as parts of what they were teaching. However, the majority of them felt that they were failing to apply all the important knowledge and skills because they did not have enough resources at their schools. They said:

> *'it is difficult to practise and implement WBTL in situations where there are only about five computers for about 60 students with no internet connection as it is the case in many of our schools especially in rural areas*.'

Others indicated in the focus group interview that they were finding it difficult to deal with the modules because they did not do Educational Technology modules in their under-graduate qualifications.

The majority of them (see Table 4.2: item 1) indicated that their assessment strategies were dominated by methods such as problem-based, project-based, inquiry-based, task-based, case-based and role-playing activities. However, the students' contextual realities of their school were not conducive to promoting any of these learning.

These results suggest that there is a shortage of relevant resources to promote WBTL in schools. This situation is further acerbated by the knowledge that

many of the students do not have formal training at undergraduate level on Educational Technology and this may discourage teachers in promoting WBTL. Therefore, this situation calls for the introduction of Educational Technology at under-graduate level as well in order to provide student teachers with a good foundation for post-graduate modules for WBTL.

The results further suggest that one needs to be a professional teacher in order to facilitate WBTL for Educational Technology students. By having a background in teaching one is expected to have knowledge of Higher Education environment, educational theories, ways of communication and have subject based knowledge (Ertmer & Newby, 1993) as well as Educational Technology background.

The dominating assessment strategies or methods suggest that facilitators' approaches were of constructivism because, according to Ertmer and Newby (1993), these above dominating methods are indicators of a constructivist approach.

### 4.3.2 Outcomes as a barrier to learning

The majority of students indicated that the outcomes for their WBTL courses were specified in the beginning of their courses (see Table 4.2: item 2). However, from our narratives, Respondent 1a was uncomfortable presenting the outcomes of the module as she felt that they restrict growth and development within students. Through focus group interview it was established that the majority of the students felt that module outcomes were useful in giving them a direction in their learning. Therefore, they felt that effective learning was not going to take place without the course outcomes. They said:

> *'there is no way that students can learn if outcomes are not given to them in the beginning because they are not going to have a direction. A module without specified outcomes can only discourage students from learning as they are not going to measure their success because we have limited time for each module. If the outcomes are not specified that will waste our given time for the module. We*

*therefore work according to the specified outcomes and stop in order to continue to the next module.'*

On the other hand Respondent 1a's five students indicated that their modules did not specify outcomes in the beginning as shown in Table 4.2: item 2. It was further established through the focus group interview that the five students felt that if the outcomes are presented too early they limit the students from digging deeper because they end up working hard only to achieve the specified outcomes and they don't go beyond the specified ones. They said:

*'we had a problem before we get used to this method of learning because we were used to the traditional method of learning where we were expecting our teachers to give us anything for the module. We were not aware that we were limited from becoming creative, active and critical thinker until we come to [Respondent 1a]'s module. Today life is easier for us as we are free to come up with several outcomes that advance our modules according to the current international standards. We enjoy our learning because our facilitator often admit that she is also learning a lot from us as she is not a source of information. Although this method of learning takes a lot of time as it is driven by students but it is the most effective method that promotes critical thinkers through WBTL environment.*

These results suggest that although learning takes place if outcomes are specified early in the course but it can also take place even if the outcomes are specified during the course of the module (even later). According to Sutton and Staw (1995) if the outcomes are specified during the time of the projects, after students have already achieved certain unspecified outcomes, students become active learners. Students become active if they are not encouraged to reproduce what is given to them by their facilitator (Susan, 1998).

They further suggested that these explicit outcomes restricted learning to those specified outcomes. The majority of students, however, were not aware that they were not controlling their learning as they were restricted from other potentials of WBTL that were being enjoyed by Respondent 1a's students (such

as contributing towards the development of their facilitator). The majority of students were limited in that they were not allowed to go beyond what they were expected to do.

Therefore, the students' analysis suggests that specification of the outcomes in the beginning of their WBTL courses may become barriers of further learning.

### 4.3.3 WBTL environments do have instructions for learning

From the questionnaire (see Table 4.2: item 3 – 7), to guide the students all the designs had instructions or concept maps, pre-statements, critical information for learning highlighted and important information placed in the centre of the screen for learners to read from left to right. It was further established through focus group interview that the majority of students felt that the guiding instructions or concept maps were useful in guiding them to finish their projects. They said:

> *'information given to us by facilitators in most cases is in small manageable chunks which we found useful in our learning. Often important information is highlighted for our attention. Introductory statements link our experience with our modules. All these guidelines for the modules, including concept maps, […] determine the success of the modules.'*

The results suggest that these designs have some characteristics of behaviourism and cognitivism. According to Ertmer and Newby (1993) behaviourism has instructions and highlighted information whereas cognitivism has chunks of manageable information as parts of their main characteristics. They further suggest that for effective learning to take place designs should include elements of behaviourism and cognitivism. Although successful WBTL students are active students (Susan, 1998) but they do need clear guidelines in the form of concept maps or certain instructions to guide them in their learning. Therefore, the results suggest that WBTL environments do have instructions that guide students on what to do.

### 4.3.4 Is WBTL a source of information or a library of resources?

From the questionnaire (see Table 4.2: item 8) it was established that not all of the facilitators' designs had recommended learning resources for students. Respondent 1b's design did not have any linked learning resources or course notes. Rather it had search engines listed as reference materials. When his students were asked (focus group interview) about learning resource, they said:

> *'we use search engines to locate our own learning resources because [Respondent 1b] does not give us any learning resources. He gives us a long list of different search engines from different countries. Most of them are useful although we need longer time to search for information than those who are given linked resources or course notes. It is not good to have linked resources or course notes because if other students find these learning resources useless and look for other relevant resources, they are sometimes failed by facilitators.'*

However, it was established through the questionnaire and focus group interview that the majority of the students, as shown in Table 4.2: item 8, felt that the most useful design has both linked learning resources and course notes. Students said:

> *'although course notes or linked resources sometimes encourage students to become passive […] it is important to have some for us to build up as a guideline. These linked resources or limited instructions are there to guide or give us the right direction after that we search whatever relevant sources we want. We are not restricted to the linked resources only.'*

Respondent 2b's students said

> *'sometimes our facilitator [Respondent 2b] gives us too much notes than other facilitators [from other modules]. We feel that it is better if he can follow other lecturers who link many relevant resources and give us course notes in a form of instructions that guide us in using the linked resources.'*

The results suggest that effective WBTL environments have learning resources and course notes for the learners to perform their projects. They further suggest that other facilitators are not flexible enough to accommodate other useful resources if they are not recommended by them. They further suggest that other facilitators do not know their own work and as a result they fail active students because they expect all students to reproduce what they give their students (to be passive students). WBTL environments can work without the linked resources or course notes if students can be introduced to the relevant search engines to facilitate learning. Therefore, if they have limited guiding instructions they become libraries of active resources instead of passive sources of information. Libraries do not have notes for specific modules or courses but one has to follow a library's instructions in order to find relevant resources that need to be used in order to finish any module or task given.

### 4.3.5 Students construct knowledge by reflecting on their experiences

From the questionnaire (see Table 4.2: item 9) and the focus group interview it was established that most of the students felt that the projects and assignments given to them by the facilitators had given them the time and opportunity to construct new knowledge using their experiences. Students said

> *'in addition to the recommended resources we have* [the] *opportunity to use our own resources which are also relevant to the projects or assignments given*. *In some cases we are able to influence our facilitators' decision to agree to our methods which were new to them*.'

However, it was further established through the questionnaire (as shown in Table 4.2: item 9) and focus group interview (as shown in the statement of the next paragraph) that some of them felt that the projects or assignments were not giving them enough space to use their experience. Instead they were given instructions followed by the facilitators' course notes that they were meant to follow to complete their projects. The students said

> *'in terms of our facilitators, their best students, who are given higher marks, are those students who are good in reproducing whatever was given by the facilitators. Therefore, we can hardly agree that*

*these projects give us an opportunity to construct knowledge by reflecting on our own experiences*.'

These results suggest that most of these students were given the opportunity to reflect on their experiences because they were able to take control of their learning by influencing their facilitators' decisions sometimes. According to Oliver and Herrington (2001) if one can influence facilitators' decision one has enough opportunity to construct knowledge by reflecting on one's experiences. Therefore, constructivism was also a part of the designs because the majority of the students felt that knowledge construction, which is one of the characteristics of constructivism (Mahoney, 2005), was part of their learning process.

However, in some cases where students were given fixed or compulsory instructions and course notes to follow, the results suggest that students were not given an opportunity to construct knowledge by reflecting on their experience.

### 4.3.6 Does the WBTL use ill defined projects?

From the questionnaire (see Table 4.2: item 10) it was established that most of the projects for the students from their facilitators were defined (structured) into tasks and subtasks. Therefore, there was no need for the students to define them according to tasks and subtasks to complete the activities. But, projects from Respondent 1a were too ill defined for students. Students then had to define their projects into the tasks and subtasks before completing the project. That is, students had to develop a project plan that required a description of the tasks and subtasks before embarking on the project work. The same projects also comprised complex activities to be investigated by students over a sustained period of time.

It was established through the focus group interviews that a majority of the students felt that it was good for them to get projects which were well defined into tasks and subtasks because they had limited time to complete the projects. Students said:

> *'if we were given ill defined projects, we were going to ask our facilitators to give us more time to go through the process of defining them which would end up increasing the number of years needed to complete our qualifications. It was not going to be good for us because if most of us were not going to define the projects according to our facilitators' expectations, most of us were going to fail the module. It is better to be given projects that are well defined because one has to answer each task or subtask based on its marks given by the facilitator and has a good idea of how long one has to write. For example, if we are writing for five marks we need not write as if we are writing for fifty marks*. *Given ill defined project is a high risk because it is the same as given hundred eggs in one basket*.'

On the other hand some of the students (5 out of 40 as shown in Table 4.2: item 10 to 12), especially those of Respondent 1a, felt that it was good to have ill defined projects because facilitators gave students longer time as they were also expected to define the projects themselves. These students said:

> *we acquired more knowledge and skills than in our normal projects defined by our facilitators, as our own defined tasks and subtasks involve different unlimited skills such as questioning skill, marks allocation skill and others that helps us to be creative. It is also easy to realise if one has to change a certain part which was not covered well before submission as one is given longer time*.

The above results suggest that, firstly, in the context of time constraints, it would be useful for facilitators to define the tasks and subtasks of project work. However, this may compromise the students' learning and creativity. Those students who were asked to define their own tasks and subtasks felt that their learning was deeper and that they could select from a range of skills to enhance their project work. Hence, for deep learning to take place, it may be useful to organise project work that have defined tasks and subtask, while at the same time allow for some parts of the project work to have unspecified task and subtasks.

The results further suggests that for the majority of students passing the module was more important and therefore they preferred more guidance at the expense of learning by gaining knowledge and skills during the process of learning. They also suggested that they didn't understand how to respond to ill defined (unstructured) projects work, almost as if they have never been exposed to it before.

On the other hand, the results of the other five students indicate that they have a lot of experience in working with ill defined projects; as a result it has become important for them to use their ill defined projects to acquire a different kind of knowledge and skills as a part of the learning process. Therefore, finishing their qualifications becomes a secondary factor after acquiring knowledge and skills as their primary factor. Anderson and Elloumi (2004), argue that if students are given ill defined projects they become active students because they examine the projects from different perspectives using a variety of resources.

### 4.3.7 Projects integrated and applied across different subject areas

From the questionnaire as shown in Table 4.2: item 14, it was established that all the students (40 out of 40) felt that projects given to them by their facilitators are integrated and applied across different subject areas. This is further supported by statements made during the focus group interviews. For example, During the focus group interviews students said

> *'we had to specialise in Educational Technology (ET) because ET is applicable in all fields as it consists of both Technology in Education (TIE) and Technology of Education (TOE). All fields use components of ET in the form of TIE or TOE and others use both TIE with TOE. The situation makes one wonder why ET does not start from under-graduate qualification in order to produce well polished Educational Technologists… Using knowledge and skills gained in ET we manage to move from one field to another. For example, we can leave teaching and work as technicians, instructional designers…'*

These results suggest that ET projects provide students with knowledge and skills that are useful in most academic fields of studies and training sectors.

They also suggest that there is a need for the under-graduate qualification for ET students. Therefore, ET does not produce its own polished products as ET specialists are valuable in their own right. Rather, it brings in people who were prepared for other disciplinary basis into ET fields.

## 4.5 CONCLUSION

This chapter has presented the findings from the data produced through the various data collections methods as detailed in the methodology chapter of the thesis. The first section presented a narrative of the facilitators' background and experiences of promoting and teaching within WBTL environments. The second section of this chapter presented the findings emerging from the students' experience of WBTL. Both these sections identified key issues that influence the teaching and learning of WBTL within a higher education environment. These key findings will be further developed in the next chapter that presents a detailed discussion of findings using the categories of the theoretical frameworks as presented in Chapter 2 sections 2.6.1 and 2.6.2. It also summarises a theoretical explanation for the three critical questions that directed this study.

# CHAPTER 5

# DISCUSSION OF FINDINGS

## 5.1 INTRODUCTION

This chapter presents a detailed discussion under the key findings, theory for WBTL as a solution, framework of the Activity Theory (AT) (see section 2.6.1) and social constructivism (see section 2.6.2). The study had to use the lenses of AT and constructivism to understand the designs of the ET facilitators' courses on WBTL environments. The discussion begins by summarising the key findings and continues with the unity of consciousness with activity; the hierarchical structure of activity; tools; objects; rules; community and division of labour.

## 5.2 KEY FINDINGS

The following key issues are issues that were identified as the key findings that influence the use, teaching and learning of WBTL within a higher education environment:

### 5.2.1 Combination of programme knowledge, education and training

In this key finding knowledge of Educational Technology, knowledge of Higher Education, knowledge of educational theories, subject based knowledge and knowledge of web communication technologies become the kind of knowledge that would allow for successful WBTL usage.

### 5.2.2 Currently change context

Facilitating context with good levels of interaction tends to allow for greater depth in using WBTL. Although the ever changing context of WBTL environments resulting in other facilitators departing for other, easier, fields. This mostly came up clearly from Respondent 1b's responses. Facilitating and challenging contexts do contribute towards promoting good WBTL facilitators (Salmon, 2003). It is demanding because of web technologies that advances all

the time within a short period of time that need facilitators to learn how to use the advancing web technology.

### 5.2.3 Outcomes specified at the beginning

Although the majority of the students felt that outcomes should be specified at the beginning of the course, it was clear that their answers were based on what they were used to. As a result, it was worth noting that even the minority of students who felt that outcomes specified at the beginning were restricting students from becoming creative or active students. The minority also indicated that they were not aware of this restriction until they experienced it from their facilitator. Therefore, it is possible that if the majority of the students can be exposed to this method of specifying outcomes in the middle of the course after they have achieved a few outcomes, the majority of the students may also change their perception about the outcomes.

### 5.2.4 WBTL instructions

Effective WBTL environments have limited instructions that introduce students on what they should follow in order to learn. Instructions are only there to give students some guidelines not to be followed in a linear way of learning.

### 5.2.5 Real-world relevance of WBTL courses

Projects given to students help students to apply what they do in their real-lives. For example, if they are teachers by profession they undertake their projects and direct them to their teaching profession in order to advance their professions.

### 5.2.6 WBTL as a library of resources

Effective WBTL environments have limited course notes in a form of guiding instructions and a list of linked learning resources (in the form of a library of resources) that are useful to students. Students are expected to add on these resources in order to finish their projects.

### 5.2.7 WBTL students construct knowledge

Students use the guiding instructions to start learning and use learning resources to work on their projects. Therefore, the main function of the facilitators is to design WBTL environments that promote learning so that students find it easy to control their learning in order to construct knowledge by reflecting on their experiences.

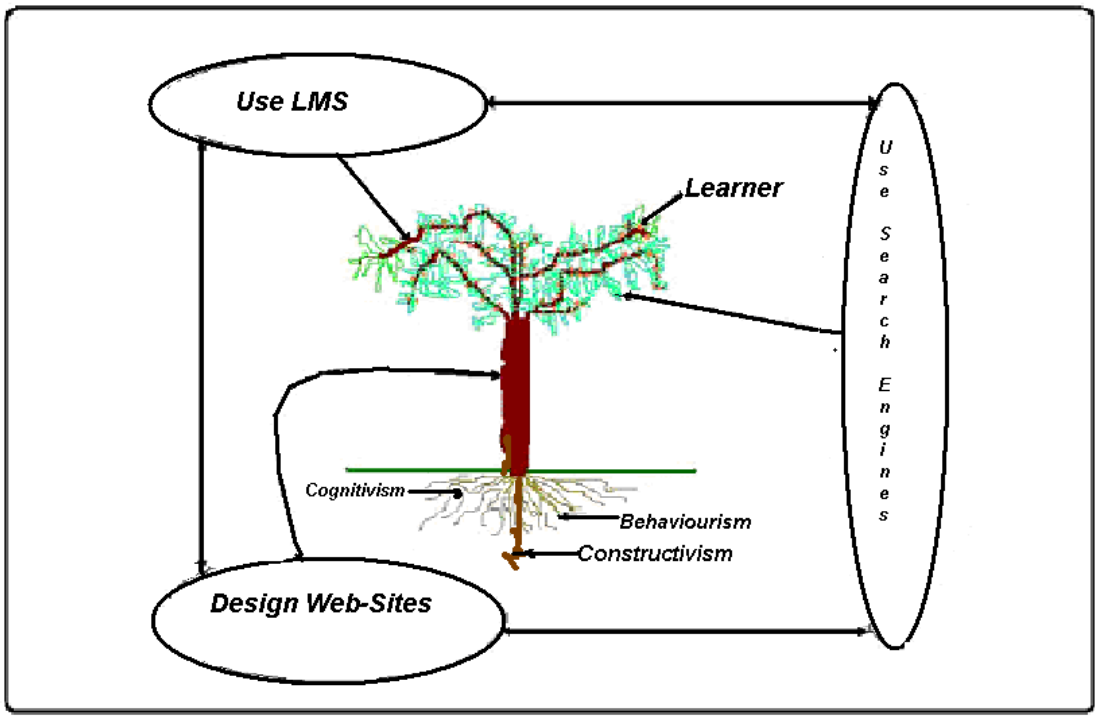
### 5.2.8 WBTL with ill defined or unstructured projects

Other WBTL projects are ill defined or unstructured for the students to define these projects into tasks and subtasks. Students may take longer time than working with defined projects but they are acquiring advanced knowledge and skills in the process of working on the ill defined projects.

## 5.3 Key theory for WBTL as a solution

The solution for the facilitators should be to apply 'The Tree Three Rings Theory' (TTTRT) in their designs for Web-Based Teaching Learning (WBTL) environments as shown in Figure 5.1: The Tree Three Rings Theory (TTTRT).

**Figure 5.1*: The Tree Three Rings Theory (TTTRT)***



This theory indicates that facilitators should imagine themselves working as farmers who are trying to grow the fruit tree between the rings in order to produce fruits. Their designs of the Web for learning should at least have the seven principles of the above theory (Figure 5.1: TTTRT).

*The first principle is the student*: Facilitators should begin by defining their students' characteristics. By so doing they will be able to group them and their learning resources accordingly in order to have a situation that will encourage the students to construct knowledge (Gognon & Collay, 1999). It is also very important for the facilitators to use the contact sessions (workshops) to introduce their students into the system and give them projects to be performed. Such projects should be given to the students together with a list of recommended linked resources (as shown in Appendix X: Respondent 2a's design showing resources) and recommended search engines but not module notes that bring about the content (students should search for themselves). If such workshops are conducted once for each of the courses then students should be given class activities taken from the main projects to perform while they are still with their facilitators off-line. This will help both the facilitators and their students to identify most of the problems that can disturb the student online. Help facilities should also be indicated to students before they go online (student-interface interaction) as suggested by Anderson and Elloumi (2004). Facilitators will understand whether their students prefer to have something like the knowledge management, performance support system, ill defined projects or not after they have defined their students' characteristics.

Students should be made aware that they are not limited to these resources only; they should dig deeper by going beyond what is given by their facilitators. The outcomes should not also be given if they are going to limit the students from digging deeper. They should be given only the aims of the module first and then later they should be told that this is what the facilitators were expecting. One may be surprised to find that they may even achieve other important outcomes that were going to be excluded by the facilitators. The outcomes should also be linked to the government policy.

In Figure 5.1 students are represented by fruits that have to be produced by the tree for people to live on. Web learning is also designed or used to produce active students to produce knowledge for other people to live on.

*Second principle is behaviourism*: The strength of behaviourism is on presenting facts (Mahoney, 2005). Therefore, facilitators should use this principle to prepare their presentation of their designs for Web learning. This does not means that their approach should be dominated by behaviourism, but behaviourism should only be used in preparing for the structure of the modules. The module structure is treated as the facts. In Figure 5.1 this principle is represented by the sub-roots because it is not dominating Web learning but can be used for certain tasks.

*The third principle is cognitivism*: The best principle to be used by facilitators to measure what they want to give their students for processing purposes is cognitivism as recommended by Anderson and Elloumi (2004). This principle should be applied by facilitators in order to measure the size of their students' sizes of their projects before they are given to students. It calls for time management, so that when the facilitators give their students any task they should make sure that the time given is enough for the students to construct knowledge. In Figure 5.1 this principle is also represented by the sub-roots because it is not dominating the WBTL environment as it can be used for certain tasks.

*The fourth principle is constructivism*: Constructivism becomes handy when facilitators want to prepare projects to be performed by students. It has a list of characteristics that should be considered by the facilitators in preparing any project for the students as presented by Herrington, Reeves and Oliver (2004). Therefore, constructivism should be treated as the main root for the tree of the three rings. It is the one that gives the facilitators reasons why they have to include or exclude different activities as a part of any given project. That is why Anderson and Elloumi (2004) indicate that it is the best theory that can help Web learning facilitators to answer all questions that have to do with the 'why'

part of their Web learning. Therefore, students' projects should have the characteristics of constructivism.

This principle also helps to guide facilitators in assessing their students and evaluating their courses as it encourages students' reflection and peer to peer assessment. It helps the facilitators to improve learning and teaching situations all the time as it brings in different important issues of constructivism as discussed in Chapter 2.

*The fifth principle is the 'use search engines'*: This principle is very important as it helps both facilitators and student to search any information anywhere in the world. Therefore, facilitators should plan for their students to use search engines to explore information and other resources to be used for their courses or modules. They can also link a few of these search engines as shown in Appendix X: Respondent 2a's design showing resources. This is the easiest ring of the tree three rings that can be learnt by facilitators within a short period of time.

In Figure 5.1 this principle is represented by leaves (search engines) of the tree (Web learning), because the leaves are the softest (easiest part) part of the tree (Web learning). Any one can learn to use the search engines faster than the other two rings.

*The sixth principle is 'use Learning Management System (LMS)'*: This is becoming popular because almost all the universities (world wide) have developed their LMSs or they are renting one of the known LMSs shown in Appendix VIII. They are also useful because they come with almost all the Web tools (technologies) that can bring reality into the Web for the students to learn. Appendix VI also shows many different important tools for the design of the Web that should be used by facilitators to facilitate Web learning. Even if they cannot design web-sites they can learn to use these Web tools that come with LMSs.

In figure 5.1 this principle is represented by the tree branches. Branches can represent the stem because they have similar parts except that they are not connected directly to the roots. Therefore, LMSs can also represent the web sites which are represented by the stem of the tree. They have all the necessary tools that can be found in any web site for learning, because all the tools are built-in as parts of the LMSs. If the stem (design web sites) is treated as the hardest (most challenging part) part of the tree (Web learning), then the branches (LMSs) should be treated as the harder (more challenging part) part of the tree (Web learning).

*The seventh principle is 'design Web-site'*: This principle is becoming the duty of the technicians, because facilitators are not interested (don't have time) in learning how to develop their own software that can be used to develop websites for learning. This ring is also useful if facilitators want to master all the tools for the Web learning, because with knowledge and skills acquired from this ring one can also apply them in the other two rings. Therefore, if facilitators have the knowledge and skills of using this ring in teaching / learning they can easily master all the tree three rings and use the advanced tools in order to operate at the advanced third level of Activity Theory (AT). Good example here is Respondent 1a who has help in the development of her university LMS. It is easy for her judging by her frames of reference.

In Figure 5.1 this principle is represented by the stem (design web-site) as it is connected direct to the roots (learning theories) as the hardest (most challenging part) part of the tree (Web learning). Designing a web site (from scratch) for learning is the most challenging part of Web learning as it needs a good understanding of programming languages as well as learning theories. The Web site for learning (stem) is also the one that produces and carries LMSs (branches) in Web Based Teaching / Learning (tree).

In concluding the theory shown in Figure 5.1 above, one needs to imagine herself / himself working with a big tree (in working with the design of the Web learning). The tree has roots which cannot be seen above the ground level, but it is known that they are there to keep the tree from falling down and provide

food for the whole tree. It is the same with these three schools of thought because they are operating underground and they cannot be seen but it is known that they are there to integrate the effective use of the tree three rings. They are operating in the same way as the roots in terms of planning, organising, preparing, practicing, presenting and revising the whole Web learning with the aim of improving the teaching and learning situation (as shown in Figure 2.2: systems approach).

## 5.4 THE UNITY OF CONSCIOUSNESS AND ACTIVITY

All the activities (designs of Web-Based Teaching and Learning environment) had an introductory part and module outcomes.

The module introduction was observed to be useful in helping students in terms of bridging the gab (Gognon & Collay, 1999) between what they knew and what they were going to understand after learning. The facilitators were using the introduction as a part of the workshop to give their students information about the modules. It was also used as a session for the module where everything was given to the students to prepare them for their online lessons. Rovai (2004) believes that these types of workshop prepare students for knowledge-construction.

Before they began to use their computers, facilitators used this introductory part of the modules to show their students that what they could do off-line they could also do online. In an online module students are exposed to many different resources which force them to become active by using their experience to look for information and build or construct new information (Newman, 2003).

This situation-preparation process was found to be useful for the facilitators and students, because once they start their first step of interaction (student-interface interaction, Anderson & Elloumi, 2004) they started to feel the disorienting dilemma (Palloff & Pratt, 1999 and Mezirow, 1991). It is within this context that the introduction part of the facilitators' activities (situation preparation) was

important as a way of using scaffolding process which recommended by Cummings and Bonk (2002) for the most successful online courses.

The outcomes were also given to students before they started their first interface interaction by the seven facilitators (except Respondent 1a). Respondent 1a's first presentation only outlines the aims of the module, not the outcomes. Once the students have the outcomes, they start to construct their own perceptions that help them to decide early whether the module is important or is of no value to them (Anderson and Elloumi, 2004). But, if the outcomes are given later, students usually dig deeper to achieve other important outcomes that were not part of the facilitator's list. In other words they become creative because they do not understand when and where to stop their knowledge construction. But whether the outcomes are specified in the beginning or not, Anderson and Elloumi (2004, p.149) encourage constructivist learning outcomes because "constructivist learning outcomes strive to apply real-world standards, and to assure that learning outcomes are applicable beyond a merely academic context."

If facilitators begin with the outcomes in preparing the situation for their students to learn, they themselves, in most cases, end up teaching their students the outcomes instead of creating a situation which consists of what students have to learn. Mezirow (1990) encourages facilitators to create these kinds of situations (disorienting dilemmas) in order to force their students to transform. In the case of the seven facilitators (except Respondent 2b), the students' transformation was not forced by the facilitators' activities, but instead it was forced by the students' levels of interaction (Anderson & Elloumi, 2004, p.21).

Levels of interaction presented automatic disorienting dilemma that forced students to start to ask different questions during their learning process. Mezirow (1991) argues that WBTL is about Transformative Learning Theory and constructivism because students find themselves in a challenging situation and use their experiences to come up with solutions that help them to access or collect relevant resources for the module. They have to exhibit and reflect on their previous experience by exercising their roles as active agents (Mahoney,

2005), the role denied to them by their facilitators who used the outcomes. The aim should be to create a situation that has relevant groupings of resources for the students to use during their learning process (knowledge construction).

These facilitators thought that the only way they could guide their students was to specify their module outcomes when they saw them for the first time so that their students could achieve them and stop digging for more. Respondent 2b even indicated that because of the lack of time, he used to give his students handouts and notes.

> *I can't teach without giving my students the notes because the notes help me to achieve the intended outcomes faster.* (for more Respondent 2b's account in Chapter 4).

Educators were not aware that by listing those outcomes they were limiting their students from working as active agents.

Respondent 1b presented everything on off-line PowerPoint presentations, including all assignments that were going to be used for assessment purposes. Most of his students started to stay away from his class because they knew what outcomes should be achieved. Although some of these outcomes could not be measured, there were five that were easy for the students to achieve without hard work. This is because such outcomes included computer literacy outcomes, yet Educational Technology modules use these outcomes as their prerequisites. These assignments have little to do with the process of trying to achieve the outcomes as they are not linked to them. The main problem for him, in trying to see if his students achieved the outcomes, was that he used words like 'know' (at the end of the module students will be able to know …) and 'understand' (at the end of the module students will be able to understand …) as a part of his outcomes. Therefore, it is clear that the seven facilitators (except Respondent 1a) use the three schools of thought in their WBTL environment. But, Respondent 1a is managing well with the constructivist approach only (as it can be observed in her design – Appendix X: Respondent 1a's design). This also came out from the following statement by her:

> *I am familiar with current theories (behaviourism, cognitivism, constructivism with, AT, TLT, ANT, connectivism and engagement theory) related to online learning with a strong leaning towards social constructivism in the virtual learning environment.*

Seven of these facilitators (except Respondent 1b) can work effectively with advanced Web learning tools because they are operating at second (action level) and third level (operational level) of the Activity Theory (AT). They also operate comfortably with the three rings of TTTR because of their strong frames of reference. In most cases they cannot even notice whether the situation the face has changed, because they are comfortable enough to adjust themselves accordingly. Kaptelinin (1997) found that if level 2 and level 3 are frustrated, facilitators set new goals for the next action or often do not even notice but automatically adapt themselves to the new situation. Therefore, the two levels are important for the university facilitators in order to help educators from schools (primary and secondary schools) as indicated in the e-Education policy (Asmal, 2003).

However, Respondent 1b still has a challenge that pushes him away from the field (ET) because the Web in teaching and learning is here to stay and is also advancing rapidly everyday. He even came out and indicated as follows:

> *To tell you the truth I am no longer interested in ET because of the high tech that keeps on reshaping the field. I am old enough to take my pension now instead of attending courses that have to do with high tech in teaching and learning. Joining Higher Education will make me comfortable to use the knowledge and skills that I have now instead of attending training in the field of ET with rapidly changing and challenging technologies. I am not good in using these Web technologies in teaching and learning…*

For him, to operate at the first level (activity level) or even the second level and be unable to master all the three rings of TTTR is not good enough because he is working for the tertiary institutions (universities). University facilitators are expected to act as the role models for the primary and secondary school

educators because, according to Makgoba (2005), they are expected to lead the transformation process of education and training in South Africa. In order to lead the transformation process they need to operate at the second level, at least, and move faster to the third level and master all the three rings of TTTR.

Thus, there is danger if the facilitators do not force themselves to acquire more knowledge and skills in order to use all the rings and operate at the third level of AT. Kaptelinin (1997) indicates that when a motive is frustrated, people are upset and their behaviour is most unpredictable. These facilitators may end up running their classes unsuccessfully because of the level of frustration created by their level of operation (first level). The levels of operation are determined by the facilitators' frames of reference (personal qualities, knowledge, skills and experience) as discussed in the next section.

## 5.5 THE HIERARCHICAL STRUCTURE OF ACTIVITY

The strength of these facilitators' qualifications, context, opportunity through employment and power has helped the facilitators to build strong frames of reference for the Web learning as recommended by White (1999) as well as White and Weight (2000). With these components of building strong frames of reference (for WBTL), one does not need any motivation from anyone because one is working within the environment or situation that favours WBTL. For example, Respondent 2b indicated that he started to use LMS a few years ago. Because he has experience in programming languages, it became easier for him to use his university LMS.

Educational Psychology / counselling courses prove to be effective in helping the facilitators to acquire knowledge on theories or approaches that influence WBTL environment and understand the three schools of thought (Anderson & Elloumi, 2004). On the other hand, computer courses help facilitators to acquire knowledge and skills in using Web tools (technologies). A combination of these two fields of study helps to produce very strong Educational Technology facilitators that can use the Web to facilitate learning. Unfortunately, Respondent 1b has been struggling with advanced Web learning technologies

because in his qualifications he has never been exposed to any of the computer courses that shaped other WBTL facilitators' frames of reference in terms of these technologies. He indicated in his blog or blogging sites that he was retiring (Appendix X: Respondent 1b's design). Web learning is one of the main factors that forced him to retire in working as a Web learning facilitator.

The findings indicate furthermore, that seven of these facilitators have most of the WBTL facilitator's frames of reference as presented in Chapter 2 drawn from White (1999) as well as White and Weight (2000). The researcher found that seven of the eight facilitators have almost all the frames of reference that are listed in Chapter 2. Such frames of reference were analysed and triangulated by means of the different instruments for data collection (see Chapter 3).

These frames of reference are important if facilitators wish to be WBTL facilitators. Mahoney (2005) believes that if facilitators plan to work effectively as the Web learning facilitators, they need to possess almost all the frames of reference indicated in Chapter 2 by White (1999) and White and Weight (2000). By possessing these frames of reference they will be able to move along the three schools of thought (behaviourism, cognitivism and constructivism). Mahoney (2004) believes he was transformed by his online work from being a behaviourist to cognitivist and then to being a constructivist. Although he passed away (died) as a constructivist, his learning designs were still in line with the three schools. Mahoney (2005) believed that any effective Web learning environment must include all the three schools of thought, drawing on their strengths. Fosnot (1996), however, believes that Web learning facilitators should transform by changing their beliefs in order to align themselves with educational changes, especially Web learning because it always involves new advanced tools. This study reveal that Mahoney's beliefs should be considered because the results for this study indicate that only one of the eight facilitators (Respondent 1a) is using constructivism, but the seven use the three schools of thought in their Web learning. Most of them claimed to use constructivism and that suggests that they are aware of constructivism in the WBTL environment because of the literature review. The results (refer to chapter 6) of this study

indicate that the best Web learning should include the three schools of thought, but dominated by the six constructivism elements indicated (situation, groupings, bridge, questions, exhibit and reflections) by Gognon and Collay (1999). But, Adeoye and Wentling (2007), strongly believe that a well designed WBTL environment allows the learners to be attentive, motivated and be able to achieve goals without fatigue and confusion. This study reveals that other facilitators (like Respondent 1b & 2b) were doing the opposite of this because they believed that the time was limited for them to finish the modules.

Anderson and Elloumi (2004) recommend that the three schools of thought must be used in any WBTL environment as taxonomies. Facilitators should use behaviourism (with the systems approach) to present facts, cognitivism to measure the amount of information to be presented and constructivism to help students contextualise the presented information. However, constructivists based their facilitation on tools (resources) more than any other component of teaching, and this is not good according to Amory (2006). His motto is that 'it is not about the tools in teaching but it is about the ideology'. He uses his *motto* to indicate to the Web learning facilitators that while they are working with tools, they must always take care of the pedagogical issues that underpin the Web learning and help students to learn with the tools instead of learning from the tools as discussed below.

## 5.6 WBTL Technologies as Tools

Tools are very important if they are used to facilitate learning instead of being used as the sources of information (Littlejohn, 2003). The tools used by most of these facilitators are advanced enough to produce the alternate system of education through the Web in teaching and learning. Govender (2001) found that the Web in (virtual) teaching and learning proves to be one of the alternate systems of education and training in South Africa. If facilitators want to use the Web in teaching and learning as the alternate system in order to educate many students without using face-to-face teaching and also bring education to wherever their students are, they have to acquire the knowledge and skills for

the advanced tools. Web learning is used by only a few institutions' facilitators, especially in African institutions.

The researcher believes that Web learning in South Africa is working well with contact sessions (face-to-face) because it combines both in a form of blended learning and has proved to be effective for facilitators (Hancock, Knoop & Zeckoski, 2006). Even in this study the results from the participants indicated that they are using blended learning as they are using the Web, mainly for informational and supplemental functions (Harmon & Jones, 1999). Although Web learning works well alone in some cases, in most cases it needs at least one contact session for an introduction as is the case for these facilitators.

Carliner (2000) believes that the following tools are important if the facilitators want to produce any effective Web-Based-Teaching Learning: namely, Internet connection, e-mail, camera and relevant software to capture and transmit images; software for viewing and transmitting video and audio images from one's computer; software that lets someone at one location display or change an image and lets people at other locations view the changes; database programmes, a well-designed database that uses terms and categories that are relevant to the students; groupware programme to encourage students to share information; word processor or web page editor; programming language; course help; HTML as well as authoring. Huber (1990) calls these tools the tools for producing virtual reality; and defines virtual reality as the creation of an artificial environment that the Internet users can experience. The majority of these facilitators were exposed to most of the advanced WBTL technologies because of the advancement of ICT in their institutions, course resources and levels of interactions as discussed in Chapter 4 under 'theme 2.'

The most common tools for them were 'chat' (Appendix X: Respondent 2a's design showing 'chat') and 'discussion' (Appendix X: Respondent 4b's design showing 'discussion') tools. They were used for students' interaction with other students or with the facilitators. Respondent 1a, Respondent 2a, Respondent 3b, use all the tools listed in Appendix X: Design learning tools available while Respondent 2b, Respondent 4a, Respondent 4b and Respondent 3a use most

of them but not all of them. But, Respondent 1b uses only one of them (blog) separate from the LMS (from google search engine). Today, LMS comes with all the advances tools (shown in Appendix VI and Appendix X). If facilitators attend any course on these LMSs (Appendix VIII) they can acquire relevant knowledge and skills in using these advanced Web learning tools. All the methods of teaching and learning (discussed in Chapter 2) need these tools to be applied in any effective Web designed for teaching and learning (Huber, 1990). It is important for the researcher to indicate that all the eight facilitators can use the email to communicate with their entire Web learning community members.

This study reveal that only six of the eight facilitators can use the HTML, let alone the other advanced programming language. HTML is one of the most important elements of any LMS or web page editor used in any Web learning (Hardin, 2006). So, it is not good if Respondent 1b is trying to work with the Web in his teaching and learning without mastering HTML. At least Respondent 2a is trying to learn HTML while Respondent 1b is not worried about any of these Web learning basic tools. He justifies this state of affairs by arguing that he is old enough to apply for his pension instead of trying to learn how to use these new advanced Web learning tools. These facilitators (with exceptional of Respondent 1a and Respondent 3b), however, will have to learn some of the tools that are shown in Appendix VI, which are still new to them. Both Respondent 1a and Respondent 3b apply these tools in their designs because they have been working with different types of Web learning.

It is thus clear that seven of the eight facilitators will go a long way in helping their students using the Web learning environment as they use all the three rings of TTTR and operate at level two and three of the AT. Facilitators are also prepared to learn in the process as they are learning newly introduced tools. The researcher can not say the same of Respondent 1b because failing to use HTML (let alone the other advanced Web learning tools) will always let him down in the world of Web learning (WBTL). All in all tools are only important as parts of the process to transform the objects into outcomes as discussed in the next section.

## 5.7 Certain parts of WBTL as identified as objects

The actual objects identified for this study are the Web designed for teaching and learning (facilitators' experiences), systems approach, behaviourism, cognitivism and constructivism. These objects became handy because the last two then decades have seen increased in WBTL particularly in the area of WBTL constructivist pedagogies (Beatty, 2002). Nichols (2003) argues that this increase in research on WBTL has been largely descriptive and technology-led instead of theory-led. The increase was technology-led because it was dominated by behaviourism. Unlike previous learning theories such as behaviourism which used technology to teach content with an emphasis on performance, constructivism uses ET to facilitate engagement of unique individual learning style, experiences and contexts in order to ensure customised meaningful learning (Duffy & Jonassen, 1992).

In terms of these facilitators' designs for the Web learning, this study reveals that they are all using different common LMSs (Appendix viii), with the exception of Respondent 1b who does not use any LMS as he only uses the easiest ring of TTTR and the blog sites. He explained his reasoning as follows:

> '*I am not good in using these Web technologies in teaching and learning, but I am very strong in using search engines and blog sites in teaching and learning as well as working as a constructivist'.*

This indicates that most of these facilitators do use the easier ring, which means they will automatically be forced by the process of their Web learning designs to master HTML if the want to advance to the next level.

After the 'introduction', students were given projects to work on or problem to solve. They were given the projects with resources that were pre-scripted by the facilitators. Almost all these projects had most of the constructivist learning characteristics such as ill defined, real-world relevance and others as discussed in Chapter 4.

In terms of giving their students resources, six of these facilitators gave their students different resources or tools that forced students to learn (construct knowledge) (Gognon & Collay, 1999) on their own by reflecting on their previous experience (disorientating dilemma, reflect and produce knowledge) according to Mezirow (1990). They list different kinds of resources for the students (Appendix X: Respondent 2a's design showing resources). Their students use their listed resources and add on them if they need more resources to finish the projects (as they are not limited to the given resources only). Therefore, the students were given opportunity to explore, critically reflect on their experiences and construct knowledge, which is the most important part of the transformative process (McGonigal, 2005).

However, Respondent 2b and Respondent 4b do not give their students this opportunity because for this section they present them with module notes. Their students do not even add other resources because they are told to read the notes in order to finish the projects. In short, they spoon-feed their students and their rationale is that they have too little time to finish their module (see Respondent 2b's narrative in Chapter 4). Chances are that they will end up producing passive students who cannot survive in the world of Web learning because it has been influenced by constructivist approach in learning (Fosnot, 1996).

The researcher believes that Web learning is not for notes, because notes take a lot of unnecessary Web learning space. Instead of making copies for different books, it is better to link these resources from other servers for students to access (see Respondent 1a's Respondent 2a's designs). But students should be given enough opportunity to explore and choose their own learning resources (Anderson & Elloum, 2004). If a course or module has little time it will be necessary for the facilitator to restructure it according to the time available. Looking at the levels of interaction it is impossible for students to learn if they are not given an opportunity to follow the necessary levels of interaction in order to reflect on their experience and construct knowledge.

Roberts and Dyer (2005), together with King and Doerfert (1996), encourage facilitators to take advantage of WBTL in promoting active students and critical thinkers because it has provided a wide range of innovative ways of facilitating learning including easier access of resources and individual guidance. Rovai (2004) believes in the same idea as he also encourages the use of WBTL because in WBTL environments, learners are encouraged to engage in reflective interaction which is characteristic of asynchronous learning networks as opposed to traditional classroom interactions where interactions are spontaneous and lack of reflection. Marbach-ad, Seal and Sokolove (2001) argue that learners coming from instructor-centred learning backgrounds often lack the skills necessary to be active learners and as a result are often frustrated and unmotivated. Therefore, they need other support system such as knowledge management and others.

In this study, the majority of students discourage the use of systems such the knowledge management and performance support system as they indicated that they worked well without them. It is tempting to agree with them because learning and interactions using these systems take place coincidently. While Berge (1999) argues that the challenge here is that such interaction must not just occur but it has to be intentionally woven into the pedagogical process and be design driven.

This study reveals that almost all the Web-Based Teaching and Learning environments for the eight facilitators were underpinned by the systems approach together with the three schools of thought (behaviourism, cognitivism and constructivism). Most of them, however, were not aware that they were using the systems approach and the three schools of thought. Zelkind (2005a) indicates that Web facilitators cannot run away from using the systems approach because it will always be important in their planning, implementation and evaluation of their Web designs. Respondent 4a uses these processes of the systems approach in her design. If one talks with her she keeps on indicating that she is strong in her design because of these processes. But, if they want to use constructivism, they will have to stop using the existing systems approach because, according to Oliver and Herrington (2001), it is

based on behaviourism. Another possibility is that they will have to work hard to transform the systems approach to a student-centred approach as suggested in Chapter 2.

For most of the eight participants, their Web-Based Teaching and Learning environments do not reflect the planning that includes Gognon & Collay's (1999) three constructivist learning elements of planning clearly (situation, bridge and grouping), let alone the last three elements (questions, exhibit and reflections) that can only work effectively if the first three are properly planned. As a result, the researcher can hardly say that these Web-Based Teaching and Learning environments are designed to facilitate constructivist learning as most of the facilitators were claiming. But only Respondent 1a's WBTL environment proves to be designed to facilitate constructivist learning. If the design of the Web is designed for constructivist learning it becomes a library of different linked resources (not the notes or content) that help students to bridge the gap between what they already know and what they want to learn (Gognon & Collay, 1999). The Web learning also brings in all the frequently asked questions so that students do not have to wander around the Web without getting answers to the questions, especially during the time of the student-interface interaction level (Anderson & Elloumi, 2004).

The first three elements (situation, groupings and bridge) planning should be given enough time so that it becomes possible for the levels of the Web learning interaction to function well (Anderson & Elloumi, 2004). During the process of interaction, students –with their facilitators in some cases–, will automatically be applying the last three elements of constructivism (questions, exhibit and reflections) as well as the five basic themes of constructivism identified by Mahoney (2005). Anderson and Elloumi (2004) used a very innovative diagram (Figure 3.4) to present the most important components of the effective design of the Web learning. Their design is dominated by the constructivism elements yet at the same time it includes a few elements of the other two schools of thought.

In terms of assessment, they all used continuous assessment with different strategies (group project, individual project or assignment, reflective journal and

portfolios), some of which are shown in Appendix X: Respondent 4b's design showing assessment. Six of them (except Respondent 1b and Respondent 2b) used written tests, class presentation and peer assessment as well (online and off-line). For these two facilitators their assessment strategy was weak because it was not easy for them to collect enough evidence that their students were submitting their own work. Their students had a chance to ask other people to write all the given assignments / projects for them and get distinctions, because they did not use any of the strategies that forced their students to demonstrate the knowledge and skills necessary for the given projects before they could start them. At least the other six can establish if their students have the knowledge and skills necessary to deal with given projects using class presentations or tests.

In terms of evaluation, they all gave their students a form to fill-in towards the end of the course or module. The researcher did not find this once off evaluation effective because students had to reshape the course or module for the next group of students, not for themselves. This kind of evaluation should be used at least three times before they finish the course or module if the facilitators want to help their current students.

It is therefore safe to say that all the eight facilitators' designs of the Web learning were similar to that of Anderson and Elloumi (2004) because they have elements of the three schools of thought. Although they sometimes had more elements of the other two schools of thought than they did of constructivism, the researcher believes that the best model to explain the designs is the TTTRT (Figure 5.1). This model was built from both the literature and the data in the context of this study.

But, not all of these designs had created some disorienting dilemmas (McGonigal, 2005) that could force the students to transform immediately after the first learner-interface interaction or workshop (as mentioned above). As a result their students transform slowly, which the researcher thinks is good if they have a long period of time to learn their modules. However, most of them had little time to learn their modules. Their pace of transformation was not suited to

the length of their modules and if they really want to continue with Web learning dominated by constructivism they will have to revisit the time given to each of their modules, revise the systems approach, and stop using the Web learning to deliver the course content. Another possibility is to explore the rules that guide the Web learning as indicated in the next section.

## 5.8 Rules for WBTL as identifies for this study

Three of the eight facilitators did not have nor had read the e-Education policy. This made it very difficult for them to generate the outcomes that are in line with what the Government requires. They ended up wasting most of their time trying to define the outcomes which can be easily generated based on the policy. Gognon and Collay (1999) are of an opinion that facilitators should not waste time with the outcomes because they should be generated or taken from the Government policies. Facilitators should start by designing the Web learning that would help their students to construct knowledge.

The most dangerous part of their designs of the Web for learning is that if the policy is not a part of their designs (Mahoney, 2005) facilitators might end up training students who cannot learn effectively in South Africa. If they go to another country that is poor in terms of technology, they learn effectively as they are not limited by any policy rule, although others might see this as giving students from South Africa an advantage because they might get employment opportunities in other countries.

It is within this context that the policy should always be consulted in any Web learning in order to give facilitators a clear guideline. For instance, the five facilitators are going ahead to make sure that all their students in all modules are exposed to Web learning. This knowledge can help because by 2013 (from the policy) all schools in South African are expected to use the Web in learning, and as such students may be able to help different schools in their areas.

One of the main areas that are emphasised by the e-Education policy is the issue of using collaboration in teaching / learning. Collaboration is divided into

asynchronous and synchronous. Zelkind (2005b), indicates that the difference between the two is that asynchronous takes place at different times and synchronous takes place at the same time. At least all the eight facilitators are strong or very strong in using email (basic tool) for the asynchronous communication, which is in line with the e-Education policy.

It is difficult for Respondent 1b because he uses only asynchronous in his blog site or email, and this is not good enough to transform his Web learning from designing it for teaching (teacher-centred) to designing it for learning (student-centred) as suggested by Fosnot (1996). Although they can all use chat tools for synchronous, only five of them (Respondent 1a, Respondent 3a, Respondent 3b, Respondent 2a and Respondent 4a) can use synchronous (video conferencing & others) effectively while they are expected to be well transformed from designing the Web for teaching to designing the Web for learning by 2013 (Asmal, 2003). Some examples of effective tools for the Web learning using synchronous are digital / video camera with relevant software, IM and others as presented in Chapter 2 and 5. In short, the researcher believes that by this indicated year 2013 all the eight facilitators will be forced to use most of the synchronous advanced tools also called ‘moderate and hard’ tools according, to Zelkind (2005b).

By understanding the ‘moderate and hard’ tools, facilitators can manage to use other important rules of the Web such as knowledge management, performance support and others as indicated by Carliner (2000). These rules are important in terms of Web learning because they provide different learning perspectives in terms of students’ interaction. For instance, collaboration and knowledge management encourage students to interact in order to learn. Without any interaction they cannot transform their frames of reference that can help them to learn or construct knowledge. Even the disorienting dilemmas that force students to critically reflect on their experiences (McGonigal, 2005) can only be experienced during the process of interaction. Also different learning styles like project-based, problem-based, case-based, task-based, inquiry-based and role-playing work effectively if the collaborative methods are used. It is a pity that the results from the majority of students indicated that they did not see the value in

using these computer systems, because their facilitators do not use them as parts of their design.

On the other hand, the AT encourages the use of the performance support if the Web learning is going to include the third level (Operation level) of AT as well. Kaptelinin (1996) feels that by preparing the tools to perform other tasks, Web learning facilitators will provide them with more time to do the other important tasks of designing the situations for the students to learn. Other students may also end up forcing themselves to operate at the third level of the AT by mastering their Web learning tools. Some of the effective performance support tools that were used by these facilitators were Statistical Package for the Social Sciences (SPSS), NVivo (for data management and analysis) and EndNote (referencing).

But Respondent 1b, Respondent 4a and Respondent 2a did not have any performance support tool to use. This indicates that one can do without the performance support tools, but one can end up taking a longer time than those who are using performance support tools. Respondent 1b indicated that his institution has too many performance support tools, but he does not want to use them because of their negative influence on human beings. For instance, the Endnote comes with a built-in style of reference (American Psychological Association or APA) which is different from his style (Harvard). This means that if he wants to use this tool he has to transform or change his way of doing things in order to accommodate the new style. He will have to change because his university has adopted the APA style (replaced the Harvard) in order to standardise its style of reference for its academic work.

It may take the South African universities a long time to manage the Web learning well if they keep on changing their computer software every year while their facilitators and students are still trying to equip themselves with the knowledge and skills of their current software. Hacker and Niederhauser (2000) recommend a good introduction of collaboration that promotes durable learning. This can be promoted by using advanced tools and learning theories that are familiar to the facilitators and students.

## 5.9 Members of WBTL as a community

Technicians play an important role as the members of WBTL environment. Respondent 2a indicated that she could not work without her technician because other parts of WBTL need someone who could deal with the technical part of her WBTL environment. The facilitators indicated that the technical support members are good in terms of technical components (tools), but not in terms of the Web for learning (pedagogy). Herrington, Reeves and Oliver (2004) feel that web sites can be designed by the technical support, but the design for the Web learning should always be designed by or involve facilitators.

Technical support members have limited knowledge of the pedagogical issues. As a result, they cannot design any Web for learning without the help of the facilitators, unless they are facilitators themselves. Duffy and Jonassen (1992) are of a view that though learning takes place in communities of learning, it is critical to ensure that learning projects facilitate engagement of unique individual learning styles, experiences and contexts in order to ensure customised meaningful learning. Bennett (2003) contends that where a course facilitator is not cognisant of the cultural diversity of the learners', misunderstandings can occur as the facilitator could inadvertently undermine the learners' cognitive strengths and academic achievements.

In terms of Web learning projects designed by the facilitators, it is clear that they have almost all the constructivism characteristics as it was also witnessed by the students (their responses from the questionnaire). This indicates that they do have many elements of constructivism in their designs, but the claim that they are using constructivism only cannot go unchallenged.

Gagnon and Collay (1999) feel that Web learning for constructivism learning should always involve a well prepared environment for the students to physically construct knowledge through interaction with the environment. Their point is important if the facilitators want to use constructivism because Mezirow (1991) reveals that students' actions or performances (construction of knowledge) are determined by the way they interpret or explain what is

happening to them during the time of their interaction with their environment. However, they cannot shy away from the reality that they use the strengths of behaviourism and cognitivism as the parts of their Web for learning designs.

## 5.10 Division of labour according to the community members

Duties were not formally divided according to the community members (facilitators, students and technical support members), but facilitators used their introductory workshops to give their students the necessary guidelines for their learning. Although, according to Kuutti (1995), it is not safe if duties are not divided according to the community members because other duties may be left unattended which may then result in the whole activity failing. This study reveals that even if duties are divided certain members can ignore their duties. The researcher thus feels that it is better if the policy that controls those duties can be flexible so that certain members who are not performing their duties can be helped by those who are committed to the whole activity.

This study finds it difficult that these facilitators were not getting enough support from their colleagues because these colleagues were afraid of working online mostly as they do not have relevant knowledge and skills in terms of working with Web learning. The colleagues' duties as community members were performed by these facilitators. The researcher feels that the most scary part of their Web learning is the political element of the Web learning as well as the time taken to develop the knowledge and skills for it.

The political element of using the Web in learning is that users use the Web to open their own space by discouraging others who have never been exposed to the use of advanced technologies. Respondent 2a even indicated that most of his colleagues do not even ask him to educate them because they think that Web learning is for the technicians. The doctors and professors feel it is beneath them to be taught by someone who is not even a doctor, as he only holds a Masters degree. He concluded that he is using Web learning in order to gain power within his institution. It was surprising to find out that most of the

other facilitators were of the same opinion, but did not want to emphasise it in so many words.

Another element that annoys the facilitators' colleagues is that their universities put more emphases on research work than any other element of learning. Web learning needs time for training while the facilitators' colleagues do not have the time as they are being pressurised by their university management to publish at least once a year. They thus find it difficult to attend any Web learning training workshop / seminar as they are busy working on their publications. These facilitators indicated that they have time for Web learning because their background can be traced from technology related fields like Educational Technology, Computer Science and others.

On the economical side of using the Web in learning, it was indicated by these facilitators that the Web learning can save their institutions a lot of money because it brings or combines all different kinds of resources that are required by the students to construct knowledge. Web learning is the most powerful tool or resource that can present a multimedia environment (Shelly, Cashman & Waggoner, 2001). The multimedia environment combines text, audio, animation, video images and the like. The Web learning does not need much paperwork, which can help the institution to save on papers and time for printing as well. Oliver and Herrington (2001) think that one of the most important factors that encourage facilitators to use Web learning is that it provides the opportunity for cost saving because of its ability to be scaled for mass delivery which saves them a lot of money, time and energy. But, on the other hand, Web learning in South Africa still needs some contact (face-to-face) sessions in order to function effectively.

## 5.11 Linking the key findings to the research questions of the study

This chapter has presented the discussion of the findings for the study. It is now imperative to summarise the answers to the three critical questions for the study as follows:

a) *What are the experiences of Educational Technology facilitators regarding the use of web technologies to promote Web-Based Teaching and Learning (WBTL)?*

The tools used by the majority of the 8 facilitators were advanced enough for them to help South Africa in developing different and / or powerful LMS. They range from analogy to digital tools that can be used to accommodate all the students' senses in learning. This can be achieved through the use of these advanced tools. Their frames of reference are in line with the use of these tools. Although the facilitators still combine WBTL with contact sessions, the tools / technologies are advanced enough to produce an effective WBTL environment (see Chapter 4).

b) *What teaching and learning philosophy informs the design of Web-Based Teaching and Learning (WBTL) environments?*

According to White (1999), these eight facilitators do have what it takes to become the good WBTL facilitators. Their frames of reference can be easily used to help other members of the universities who have the same frames of reference and those who do not in order to transform. The facilitators' WBTL environments are informed by the systems approach, behaviourism. cognitivism, TLT and most of them by constructivism.

Although most of the participants do use the different methods of engaging the students as part of their Web learning, facilitators will still have to develop more advanced methods using the existing methods of interaction.

c) *How do students experience learning through the WBTL environment?*

It is clear from the results that the eight facilitators' designs for WBTL were dominated by the constructivism learning theory. This also is reflected from the students' point of view that most of the eight facilitators' tasks that were given to the students have almost all the characteristics of constructivist learning (see

section 2.6.2). The other two schools of thought (behaviourism and cognitivism), however, also contributed towards the Web learning environments.

The next chapter (Chapter 6) presents the conclusion, recommendations and the summary of the study. Chapter 6 also includes recommendations on suggested areas of further study within the Web-Based Teaching and Learning environments.

# CHAPTER 6
# CONCLUSION, RECOMMENDATIONS AND SUMMARY

## 6.1 CONCLUSION

This chapter concludes the study and presents the recommendations and summary based on the findings. South Africa has a great need for the WBTL or Web learning in order to take formal education to the majority of the citizens that cannot attend full time classes. Asmal (2003) opened the way for the Web learning by introducing the e-Education policy (Draft White Paper) for schools. Any education or training in South Africa "must model the use of ICT as a mode of delivery, allowing for greater levels of collaboration, inquiry, analysis, creativity and [knowledge] production" (Asmal, 2003, p.28). Higher Education institutions are expected to lead these processes.

The Web-Based Teaching and Learning environment is capable of combining all the knowledge, skills and tools necessary to perform the above mentioned duties or processes in order to achieve any defined outcome in learning situations. The greater level of collaboration that can be created can be in the form of both asynchronous and synchronous communication by using the necessary tools.

In terms of the greater level of inquiry, there are many search engines (the easiest ring of The Tree Three Rings (TTTR) that can be built into the Web learning for the students to search or inquire about anything. This means that the duty or process of inquiry can be performed by any one who is familiar with at least one or more of TTTR or at any level of the Activity Theory (AT).

For the analysis the WBTL environment can be designed in such a way that it incorporates different software that promotes collaboration and interaction such as the video and digital camera. Such software can be used by both facilitators and students as part of their Web learning.

The Web learning designed for constructivist learning encourages the creativity and knowledge production processes or duties. Constructivist learning theory according to Kukla (2000) encourages the design of the Web for learning to bring in many different resources that can help students to construct knowledge. As it is clear from the results of this study that all the designs of the Web designed by the eight facilitators were dominated by the constructivist learning theory, then creativity and knowledge production processes can be easily achieved in South Africa if the eight facilitators can effectively influence other facilitators. They can influence their colleagues and those from other universities by encouraging them to transform from the two schools of thought (Behaviourism and Cognitivism) to constructivism as well.

Although there is nothing wrong in using the few strong elements of the two schools as parts of their designs, Mahoney (2005) encourages the Web learning facilitators to always consider the strengths of constructivism learning in designing any Web learning. With the constructivism learning theory it is easy to transform students who are passive to active students by exercising the use of the three main important elements of the TLT (disorienting dilemmas, critical reflection and the identification of psychic assumptions) as identified by Mezirow (1990).

These facilitators have all the relevant terms of reference and most of them use the advanced Web learning tools with all the rings of TTTR together with the second (Action level) or third (operation) levels of the AT. They also use most of the teaching / learning rules for effective Web designed for learning as recommended by Carliner (2000). Although one of the eight was far behind the others he could learn from them because they have all the necessary frames of reference (perspective transformation).

The following section presents the solutions (as recommendations) to the problems (challenges) that arise when using the Web for learning. After they are presented they are evaluated or tested by means of Activity Theory (AT) as the main frame for this study.

## 6.2 RECOMMENDATIONS

The following recommendations are based on the five themes with key findings discussed in Chapter 4. After the recommendations 'The Tree Three Rings Theory' (TTTRT) is discussed as the recommended 'model or theory' to be used in designing a WBTL environments in the context of the South African universities. TTTRT cover all the important issues from both facilitators and students even those that are not a part of the five themes (from students).

### 6.2.1 Recommendations

*Recommendation one*: Educational Technology (as a course) should be introduced as a part of under-graduate qualifications. The course should consist of Information Technology module (with Computer component), Educational Psychology module, English module and other modules that deal with policy and assessment.

These four universities should give Educational Technology facilitators an opportunity to attend workshop, conferences and seminars that deal with Information and Communication Technology (ICT) (including WBTL). Facilitators should be given an opportunity and encouraged to work with other specialisations such as Computer Science and Educational Psychology specialisations and also form a link with other universities for experience and power.

*Recommendation two*: These four universities should always budget for the latest development in WBTL technology so that facilitators can be in line with the latest technology rather than trying to learn something that is a couple of years old. WBTL courses should consist of a list of well planned teaching and learning resources that promote and encourage all the four levels of interaction (Hillman, Willis & Gunawardena 1994) plus the Student's approach or Cultural-interaction as suggested in this study as part of the summary below.

*Recommendation three*: WBTL environments should be guided by Activity Theory (AT), strengths of behaviourism, strengths of cognitivism and strengths of constructivism as shown in the TTTRT.

*Recommendation four*: The four universities should support Educational Technology (ET) facilitators by employing part time lecturers to reduce their workload and be able to work on their publications. ICT publications should be encouraged so as to keep the facilitators connected to other national and international ET experts.

*Recommendation five*: Facilitators should explore and link to all the fields that contribute towards the development of ET such as Computer Science, Educational Psychology, English, Media studies, ICT and other in order to be up to date with latest trends.

*Recommended study*: A follow up study which is recommended is a study on 'a critical analysis of student satisfaction and learning outcomes in WBTL courses in South Africa universities.

The next section gives a summary of this study

## 6.2 SUMMARY

This study has recommended that Web Based Teaching and Learning (WBTL) environments in South Africa need to be encouraged to continue in a form of blended learning. It is safer for the facilitators to use both face-to-face and WBTL. As this is seen as a safer approach in this study. This is because if one considers the challenges that led to the failure of the E-Universities in promoting learning, one can see that tools will always need a human touch (Cardinali, 2004). This means that if something is not working online, it should be given to the face-to-face approach without compromising the quality of learning. Even if WBTL fails, there will always be a need for people to learn. Therefore, the two approaches (face-to-face and WBTL) need to be equally treated because, according to this study, it has become clear from the literature review and

findings (data) that facilitators were successful in their facilitation of learning because they use both of these approaches. For example, they all involved face-to-face in a form of a workshop before they introduce their WBTL courses.

In terms of Educational Technology (ET), they should use both Technology in Education (TIE) and Technology of Education (TOE) equally according to specific needs. If, for example, certain elements of TIE or TOE are not designed for WBTL, there is no need for the facilitators to force their way because that will end up affecting the whole process of learning. One good example from the findings is the case of Respondent 2b who uses the Web to reproduce course notes instead of linking the resources for the learners. This becomes a problem because if his university does not have enough space on the server to accommodate his other colleagues, his work will block other important resources from his colleagues. This may lead to a situation where his university is running short of space in the server.

In terms of TIE (tools or technologies) facilitators should choose the most suitable technology that would produce effective learning instead of using a certain tool just because it is new. TIE should not be used to take the place of the facilitators because learner-interaction level will become impossible. TIE online should be introduced step-by-step beginning with basic tools to the advanced ones to assist the learners who are using these tools for the first time (scaffolding).

On the other had, TOE (theories or approaches) should be used in the same way as TIE. More challenging tasks should come later, otherwise they push students away. As a result the researcher proposes in this study that an additional level of interaction (student-approach or cultural interaction) which can give learners time to figure out if s/he has the best or relevant approach to study a specific WBTL course has to be introduced. In most cases other students fail the course, not because they have a problem with content, but because of an approach that is not familiar to him or her (Mezirow, 1990). Other facilitators even start their assessment process for grading, while learner-interface interaction is still a problem to most of the learners.

Finally, the study has found that there are many ways that were used by the facilitators in acquiring knowledge and skills relevant to Educational Technology and WBTL. Facilitators' experiences promoted relevant frames of reference (personal qualities, knowledge, Web technologies and online interaction experience and characteristics of constructivism) in them.

On the other hand WBTL environment involves the use of search engines in teaching and learning; design websites for teaching and learning; use Learning Management System in teaching and the three schools of thought (behaviourism, cognitivism and constructivism).

Therefore, facilitators should be aware of these parts in order to work comfortable with WBTL environments.

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Box 42707
Isipingo
4110
17 February 2005

Dear Principal / Vice-Chancellor

I am undertaking a research project on "design analysis of Educational Technologists Web-Based Teaching and Learning environment in South African Higher Education institutions". Therefore, it will be highly appreciated if you could complete the attached questionnaires and email them as attachments to my email address @ukzn.ac.

The Web is influencing the ways in which people are being educated and trained. South Africa, like any other developing countries, is forced to conduct studies of this nature in order to critically analyse the Web as a pedagogical resource in education and training. Therefore, this study aims at providing valuable information on the web in teaching and learning as well as constructivism together with other important pedagogical issues that are used in teaching and learning (using the Web).

## Please take note of the following issues:

1. There will be no limit on any benefit that the participants may receive as part of their participation in this research project;
2. Answer all the questions;
3. Respond to each question in a manner that will reflect your own personal opinion;
4. Your identity will not be divulged under any circumstance;
5. There are no right or wrong answer;
6. All your responses will be treated with strict confidentiality;
7. Real names of the participants will not be used, but symbols such as A, B, C or X, Y, Z … will be used to represent participants' names;
8. The participants are free to withdraw from the research at any time without any negative or undesirable consequences to themselves;
9. The participants will not be under any circumstance forced to reveal what they don't want to reveal; and
10. No audio or video recording will be made.

This research project is supervised by Dr P Ramrathan. His telephone number is (031) 260 8064 at the University of KwaZulu-Natal and his email address is @ukzn.ac.

**Thank you for your support, co-operation and valuable time: Best wishes from**

SB Khoza (Bheki)
DED / PhD student at the University of KwaZulu-Natal (Student no. 9804243)
Tel.: (031) 260 7595
Cel.: 083 3111 468
Email: @ukzn.ac.

## Please sign the following declaration and include your full names as indicated:

**I……(full names of participant) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project.**

**I understand that I am at liberty to withdraw from the project at any time, should I so desire.**

**……** **……**

**SIGNATURE OF PARTICIPANT** **DATE**

Box 42707
Isipingo
4110
17 February 2005

Dear Facilitator

I am undertaking a research project on "design analysis of Educational Technologists Web-Based Teaching and Learning environment in South African Higher Education institutions". Therefore, it will be highly appreciated if you could complete the attached questionnaires and email them as attachments to my email address @ukzn.ac.

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8. The participants are free to withdraw from the research at any time without any negative or undesirable consequences to themselves;
9. The participants will not be under any circumstance forced to reveal what they don't want to reveal; and
10. No audio or video recording will be made.

This research project is supervised by Dr P Ramrathan. His telephone number is (031) 260 8064 at the University of KwaZulu-Natal and his email address is @ukzn.ac.

**Thank you for your support, co-operation and valuable time: Best wishes from**

SB Khoza (Bheki)
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Tel.: (031) 260 7595
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Email: @ukzn.ac.
Website: ://myweb.absamail.co.za/bhiza/ or ://bhekikhoza.blogspot.

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**I understand that I am at liberty to withdraw from the project at any time, should I so desire.**

**……** **……**

**SIGNATURE OF PARTICIPANT** **DATE**

Box 42707
Isipingo
4110
17 February 2005

Dear Student

I am undertaking a research project on "design analysis of Educational Technologists Web-Based Teaching and Learning environment in South African Higher Education institutions". Therefore, it will be highly appreciated if you could complete the attached questionnaires and email them as attachments to my email address @ukzn.ac.

The Web is influencing the ways in which people are being educated and trained. South Africa like any other developing countries is forced to conduct studies of this nature in order to critical analyse the Web as a pedagogical resource in education and training. Therefore, this study aims at providing valuable information on the web in teaching and learning as well as constructivism together with other important pedagogical issues that are used in teaching and learning (using the Web).

## Please take note of the following issues:

1. There will be no limit on any benefit that the participants may receive as part of their participation in this research project,
2. Answer all the questions,
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8. The participants are free to withdraw from the research at any time without any negative or undesirable consequences to themselves,
9. The participants will not be under any circumstance forced to reveal what they don't want to reveal and
10. No audio or video recording will be made.

This research project is supervised by Professor G Kistan. His telephone number is (031) 260 8011 at the University of KwaZulu Natal and his email address is @ukzn.ac.

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**I understand that I am at liberty to withdraw from the project at any time, should I so desire.**

**……** **……**

**SIGNATURE OF PARTICIPANT** **DATE**

# QUESTIONNAIRE (8 Facilitators only)

## A. *For each of the following personal qualities, knowledge / skills, tools and experience place a cross (X) (rate yourself) in only one of the boxes:*

| **Personal Quality** | Very Strong | Strong | No Sure | Poor | Very Poor |
|---|---|---|---|---|---|
| 1. Conceptual and systemic thinking (able to put it all together) | 5 | 3 | | | |
| 2. Caring and compassionate | 8 | | | | |
| 3. Accepting of others and hold others with unconditional regard | 4 | 3 | 1 | | |
| 4. Accommodating different issues in teaching | 4 | 2 | 1 | 1 | |
| 5. Concern for quality (and able to describe it) | 1 | 2 | 2 | 3 | |
| 6. Neutral (no vested interest in one solution over another) and honest. | 3 | 5 | | | |
| 7. Flexibility (ability to switch gears at the last moment) | 3 | 2 | 2 | 1 | |
| 8. Open to self-growth | | 8 | | | |
| 9. Sense of when to stay quiet | 2 | 3 | 1 | 2 | |
| 10. Self knowledge and awareness (strengths and weaknesses) | 2 | 5 | 1 | | |
| 11. Inspirational | 2 | 3 | 1 | 2 | |
| **Your knowledge in each of the following** | | | | | |
| 12. Adult learning principles | 3 | 4 | 1 | | |
| 13. Teaching / training | 4 | 4 | | | |
| 14. Learning styles | 5 | 3 | | | |
| 15. Knowledge of assessment of audience (online) | 4 | 3 | 1 | | |
| 16. Group facilitation | 5 | 3 | | | |
| 17. Group and interpersonal dynamics | 4 | 4 | | | |
| 18. Cultural competency | 3 | 2 | 1 | 2 | |
| 19. Communication styles | 1 | 7 | | | |
| 20. Asking questions that will lead to insight | 4 | 4 | | | |
| 21. Asking provocative questions | 3 | 5 | | | |
| 22. Using problems, questions, tools and other means to stir the mind and body to learn | | 8 | | | |
| 23. Providing all answers to the participants | | 2 | 1 | 3 | 2 |
| 24. Clarify experiences for additional insights | | 2 | 3 | 3 | |
| 25. Create or nurture constructive conflict or "creative abrasion" | 2 | 3 | 1 | 2 | |
| 26. Focus -- keeping the discussion on track | 3 | 2 | 1 | 2 | |
| 27. Listen from a non-judgmental place | 2 | 3 | 2 | 1 | |

| | | | | | |
|---|---|---|---|---|---|
| 28. Listen for understanding and context | 4 | 4 | | | |
| 29. Maximize gaining of knowledge and skill in the time available | 5 | 3 | | | |
| 30. Notices patterns in group interaction and brings it up to the group for exploration. | 3 | 5 | | | |
| 31. Notices what is not said as well as what is | 3 | 5 | | | |
| 32. Observes and listens for opportunities and actualities of learning | 4 | 4 | | | |
| 33. Pacing skills --change the level of the discussion at the appropriate time (from brainstorming, to evaluation, to decision, to action planning, or from thinking to feeling) | 3 | 5 | | | |
| 34. Presentation skills | | 8 | | | |
| 35. Problem solving | | 8 | | | |
| 36. Ability to extract positive outcomes from difficult situations | 2 | 5 | 1 | | |
| 37. Read interaction between individuals, and the subtleties of group | 3 | 5 | | | |
| 38. Resume / restart groups | 3 | 4 | 1 | | |
| 39. Steer the group in a positive direction | 2 | 6 | | | |
| 40. Summarization skills (succinct, accurate, non-judgmental) | 2 | 6 | | | |
| 41. Use out-going participants to get the discussion rolling and make room for the quiet ones | 3 | 5 | | | |
| 42. Writing skills | 4 | 4 | | | |
| **In using the following tools** | | | | | |
| 43. Tagging tools | 2 | 2 | 2 | 2 | |
| 44. Email list software (i.e. "listservs") | 4 | 3 | 1 | | |
| 45. Threaded / linear discussion tools | 6 | 1 | 1 | | |
| 46. Social networking tools | 2 | 2 | 2 | 2 | |
| 47. IM (instant messaging) tools | 1 | 2 | 2 | 3 | |
| 48. Chat tools (IRC, java, html, voice) | 3 | 5 | | | |
| 49. HTML (HyperText Markup Language) | 4 | 2 | 2 | | |
| 50. Web page publishing | 6 | 2 | | | |
| 51. File Transfer Protocol (FTP) | 3 | 3 | 2 | | |
| 52. Groupware tools (that encourage people to share information) | 5 | 2 | 1 | | |
| 53. Blogging (Blog) tools | 5 | 2 | 1 | | |
| 54. Tracker tools | 5 | 1 | 2 | | |
| 55. Search engines | 8 | | | | |
| 56. Wide Area Information Server (WAIS) | 3 | 3 | 2 | | |
| 57. Web page editor software | 7 | | 1 | | |
| 58. Gopher | 2 | 2 | 1 | 3 | |
| 59. Newsreader software | 2 | 2 | 1 | 3 | |
| 60. Camera and related software to capture and transmit images | 3 | 3 | 2 | | |
| 61. Wikis | 3 | 2 | 2 | 1 | |

| | | | | | |
|---|---|---|---|---|---|
| 62. Connection to a high speed network that lets you transmit video and audio images | 2 | 3 | 2 | 1 | |
| 63. Microphone and related software to capture and transmit sounds | 2 | 3 | 2 | 1 | |
| 64. Software for viewing and transmitting video and audio images from your computer | 3 | 2 | 1 | 2 | |
| 65. Software that let someone at one location display an image and let people at other locations view it | 3 | 2 | 1 | 2 | |
| 66. Software that let someone at one location change an image and let people at other locations view the changes | | 2 | 2 | 4 | |
| 67. Database program | 2 | 3 | 2 | 1 | |
| 68. Programming language | | 3 | 2 | 3 | |
| 69. Word processor / web page editor application software for preparing the text of the learning programme | 2 | 4 | 1 | 1 | |
| 70. Software for reading / playing course material from the Internet | 3 | 3 | 1 | 1 | |
| 71. Presentation software for preparing slides and visuals | 7 | 1 | | | |
| 72. Software for retouching photos | 3 | 4 | 1 | | |
| **Online interaction experience** | | | | | |
| 73. Social online communities | 3 | 3 | 2 | | |
| 74. Chat, live events (synchronous) | 4 | 3 | 1 | | |
| 75. Email lists | 4 | 4 | | | |
| 76. Multi-Object Orientation | 2 | 1 | 2 | 3 | |
| 77. Multi-User Dungeon, Dimension, or sometimes Domain (MUD) | 2 | 1 | 1 | 2 | 2 |
| 78. Virtual teams / virtual workgroups | 2 | 3 | 3 | | |
| 79. Cross cultural groups | 3 | 3 | 2 | | |
| 80. Distance education / training | 4 | 4 | | | |

81. What software do you use in designing a learning space?

……

……

…….

82. What are the most useful features of the software mentioned in Question 86?

……

……

……

……

……

83. Please write any other comment(s) on personal qualities, knowledge / skills, tools and / or experience if you still have them:

……

……

……

……

……

……

……

……

……

……

……

84. What learning / teaching theories / philosophies do you use in designing you web learning / teaching space?

……

……

…….

# QUESTIONNAIRE (40 Students)

**A.** ***For each of the following projects, tasks or assignments characteristics and rules used in teaching / learning place a cross (X) (rate your projects, assignments or tasks and your experience in using the following teaching and learning rules) in only one of the boxes:***

| CHARACTERISTICS | Number of Strongly Disagree | Number of Disagree | Number of Not Sure | Number of Agree | Number of Strongly Agree |
|---|---|---|---|---|---|
| 1. They have real-world relevance | | 1 | | 20 | 19 |
| 2. They start with the explicit outcomes of the web learning / lesson. | | 5 | | 21 | 14 |
| 3. They start with pre-learning statements (pre-instructional questions) before the actual learning takes place. | | 2 | 1 | 28 | 9 |
| 4. They come with / provide conceptual models / concepts maps. | | 3 | | 28 | 9 |
| 5. They have information presented in chunks. | | 3 | | 27 | 10 |
| 6. They have important information placed in the centre of the screen for learners to read from left to right. | | 3 | | 28 | 9 |
| 7. They have information critical for learning highlighted. | | 2 | 1 | 27 | 9 |
| 8. They have learning materials that include activities for the different learning styles. | | 2 | 1 | 30 | 7 |
| 9. They encourage learners to construct their own knowledge rather than accepting that given by the facilitator / instructor. | | 3 | 4 | 29 | 4 |
| 10. They give learners time and opportunity to reflect and take control of the learning process. | 2 | 15 | 5 | 14 | 4 |
| 11. They are ill defined, requiring learners to define the tasks and subtasks needed to complete the activity | 2 | 3 | | 20 | 15 |

| | | | | | |
|---|---|---|---|---|---|
| 12. They comprise complex activities to be investigated by learners over a sustained period of time | 1 | 4 | | 20 | 5 |
| 13. They provide the opportunity for learners to examine the task from different perspectives using a variety of resources | 4 | 21 | | 3 | 2 |
| 14. They provide the opportunity to collaborate (Collaborative and cooperative learning). | | | | 32 | 8 |
| 15. They provide the opportunity to reflect and involve learner beliefs and values | 2 | 5 | | 30 | 3 |
| 16. They are integrated and applied across different subject areas and extend beyond domain-specific outcomes | | | | 30 | 10 |
| 17. They are seamlessly integrated with assessment | | 3 | | 20 | 17 |
| 18. They yield polished products valuable in their own right rather than as preparation for something else | | 13 | 7 | 19 | 1 |
| 19. They allow competing solutions and diversity of outcomes | 1 | 12 | 6 | 18 | 1 |
| **Teaching / Learning Rules** | | | | | |
| 20. Collaboration (Groupware) | | | | 31 | 9 |
| 21. Learning through Knowledge Management (Knowledge base) | 8 | 22 | 1 | 5 | 4 |
| 22. Performance Support (Electronic Performance Support System – EPSS) | 7 | 23 | 2 | 4 | 4 |
| 23. Online Training and Education with course notes | | 6 | | 32 | 2 |
| 24. Online Training and Education with linked learning resources | | 6 | | 30 | 4 |

……

……

## B. *GENERAL INFORMATION*

### Please answer each of the following questions

Name of your institution:

…….

Your racial group: ……...

Your present rank / year of study: …….....

Your highest qualification or presently enrolled for:

…...……..

Your age: ……

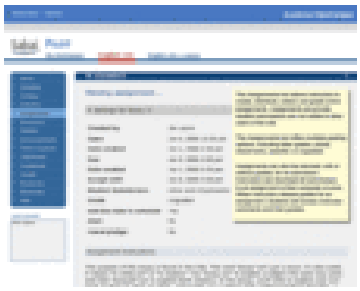
Gender: ……...

How long have you been in this institution (In years): ……..

{In order to view the following Sakai windows (Appendix VI) one needs to have the soft copy of this document and then Press the Control (Ctrl) and Click the Figure (One's computer must be connected to the Internet in order to access the server which has these windows)}

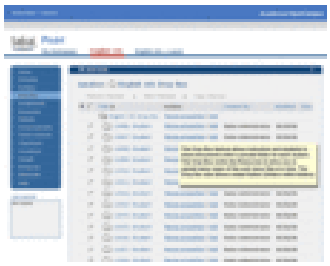
## "Teaching and Learning"

### Assignments Tool



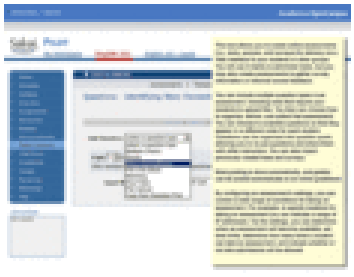
The Assignment tool allows instructors to create, distribute, collect and grade online assignments. Sakai offers two Assignment tools. One Assignment tool has a grading component and would typically be used in a course worksite. The second Assignment tool does not contain a grading component and would typically be used in a project worksite.

### Drop Box Tool



The Drop Box tool within Sakai allows students and instructors to share documents within a private folder for each student. A drop box is created for each student within a course or project by default when the individual is added as a participant to a worksite that includes the Drop Box tool. The instructor has the ability to view all the contents of the drop box that is created for each student. Students only have the ability to view the contents of their own drop box.

### Test & Quizzes



The Sakai Assessment Manager allows the instructor to create, deliver, and grade assessments. The instructor has the ability to create assessment templates that control assessment settings and manage assessment content using question pools. The assessment templates allow instructors to

manage different types of settings for a specific assessment type. These settings include security settings, time limitations, feedback options, submission options, assessment organisation and navigation options, and grading options.

## Syllabus Tool

The Syllabus tool provides instructors the ability to create and post their course syllabus online. The Syllabus tool has a rich content editor that allows for easy content creation online. Instructors can also input a web page through the redirect button and have an offline syllabus posted. Instructors can choose to have a notification email sent to site participants of the syllabus posting.

## Home

The Home page is the landing place for each worksite. It can be customised to include multiple tools. By default, the Home page includes the most frequently used tools by worksite users.

## Elluminate Live! Virtual Classroom (Pilot Program Only)

Exclusively available via the Sakai Pilot Program. Along with your Sakai worksite, you also get Elluminate Live! Lite Office™. It's the personal-sized, single-room online collaboration tool that's perfect for one-on-one tutoring, virtual office hours, group project meetings, exam review sessions, and more. Lite Office gives you a virtual office room where you can meet with students and collaborate with colleagues using 2-way voice over IP, shared whiteboard, and text chat.

# Collaboration & Research Tools

## Announcements Tool

Announcements are used by the site owner/creator to publish important information to worksite participants. Announcements can be posted to the entire worksite which allows access to all of the worksite's participants or announcements can be targeted to specific groups or sections within the worksite. The posted announcement can include attachments, website links, or items from the Resources tools in the worksite.

## Chat Room Tool

The Chat Room provides an area for instructors and students to have real-time unstructured conversations with other participants in a course or project worksite. The Chat tool supports the creation of multiple chat rooms, enabling a class to break into small groups for real-time dialogue.

## Discussion Tool

The Discussion tool within Sakai provides users the ability to collaborate among classmates and team members within a given course or project worksite. The instructor has the ability to create pre-defined discussion topics for the students or provide students the ability to create their own topics. The discussion tool supports both flat and threaded discussions among its participants.

## Email Archive Tool

Worksites with the Email Archive tool are assigned a worksite email alias. This email alias acts as a list serve and sends an email to all site participants based on the notification preferences the individual has outlined in their My Workspace. This list serve creates a collaborative environment and provides all site participants the ability to participate and respond. These email threads are stored in the Email Archive tool within the course or project worksite and site participants have the ability to search for emails stored in this tool. This is not part of the Sakai Pilot program by default.

### Schedule Tool

The Schedule Tool within Sakai provides an online calendar for each project or course worksite that is created. The Schedule tool is integrated with the Announcements and Assignment tool. Instructors have the ability to add course-related events, assignments, and announcements in the worksite calendar. Each user also has a Schedule tool available within their personal My Workspace site where the user can track personal items.

### Synoptic Tools

Sakai has the ability to display synoptic views of certain tools so that participants may view such things as announcements and chats from several worksites in a single synoptic view.

## Content and Information

### News Tool

The News Tool allows users to consume RSS feeds from their [favourite] news sources.

### Resources Tool

The Resources Tool allows for easy file sharing between the users within a given project or course worksite. The instructor has the ability to add additional metadata for each resource item added to the worksite. Optional properties allow the instructor or administrator to include abstracts and identify a specific target audience for a resource folder or an individual resource item.

### Web Content Tool

The Web Content tool allows instructors to make relevant web content available to their class or project. A small window, or IFRAME renders content from a website determined by the instructor, and participants may interact with the website as if they were visiting it outside of the learning environment.

### WebDAV Support

Sakai users may enable WebDAV with Sakai in order to take advantage of moving multiple resources and other files into Sakai at once.

## Personal

### Help Tool

The Sakai application includes a system knowledge base which offers context specific help. The user has the ability to perform full text searches within the help documentation.

### Membership Tool

The Membership tool allows the user to manage their membership in the courses or projects they participate in. Course worksite access is typically limited to course participants; however, project and special interest worksites are often made joinable by Sakai users.

### My Workspace

Every user in Sakai has a personal worksite, known as My Workspace. The My Workspace worksite provides each user a tool set that allows them to manage their personal and private information.

## Administrative Features

Sakai has a full range of administration tools for institutions to take advantage of. Please note, all these features are not available in the Academus Open Campus environment.

### Permissions and Roles

Administrators may define the security permissions in Sakai for users, worksites, and content.

## Site Info Tool

Allows site participants to see general information about the worksite. This includes the description of the worksite, site owner/creator and the owner's email address, the site creation date, and who has the ability to join.

## Worksite Setup Tool

The Worksite Setup tool provides users the ability to manage existing worksites and create new ones”

**Table:** Software used by the eight facilitators for WBTL environments

| Institution | Software | Facilitator | Comment |
|---|---|---|---|
| INSTITUTION 1 | WebCT and Window Learning System | Respondent 1a | Respondent 1a is currently using WLS in designing and teaching using the Web, but she did use WebCT before the WLS. WLS was developed by Institution 1 |
| INSTITUTION 1 | Search Engines for teaching and blog / blogging sites | Respondent 1b | Respondent 1b only uses search engines and blog / blogging sites in designing and teaching Web usage |
| INSTITUTION 2 | WebCT and Window Learning System | Respondent 2a | Respondent 2a has been using WebCT, but she has changed to WLS |
| INSTITUTION 2 | WebCT and Window Learning System | Respondent 2b | Respondent 2b has also been using WebCT, but she has changed to WLS |
| INSTITUTION 3 | Sakai and Open | Respondent 3a | Respondent 3a uses both the Sakai and Open. Open was developed by the institution (INSTITUTION 3) |
| INSTITUTION 3 | Sakai and Open | Respondent 3b | Respondent 3b also uses both the Sakai and Open. |
| INSTITUTION 4 | Sakai and EINSTITUTION 4 | Respondent 4a | Respondent 4a uses both the Sakai and EINSTITUTION 4 in designing and teaching using the Web |
| INSTITUTION 4 | WebCT, BlackBoard, Atutor, Sakia and EINSTITUTION 4 | Respondent 4b | Respondent 4b has used the WebCT, BlackBoard and Atutor before he changed to Sakai with EINSTITUTION 4 |

Table: indicates that the four institutions started with proprietary and moved to the open source software. Most of the eight facilitators started with the WebCT while others started with Sakai. Almost all the four institutions have developed their own LMS or adapted it from other institutions. For example INSTITUTION 1 developed the WLS and it was adapted by INSTITUTION 2 to try to replace the WebCT. Respondent 1b does not use any LMS; s/he only uses search engines and blog / blogging site in designing and teaching Web usage.

# Product List

| | | | | |
|---|---|---|---|---|
| . | 6. | 6. | 6. | 1.4. |
| 1.4. | 1. | WebMentor 4. | _ | 5. |
| _ | 6.2 | Academic | | 4.0. |
| 6. | 1.2. | 1. | 2. | 1.3. |
| 2. | 7. | 7. | 7. | AU+ |
| | 3. | 7. | | |
| Course Assistant 2. | SME 3.1. | Toolbox 5. | Toolbox 6. | Internet Campus Solution 1. |
| e-education | 1. | eLearning | | -CAPA 1. |
| -CAPA 1. | -CAPA 2. | Virtual Classroom 2. | 1.5.3. | 2.0. |
| 1. | 1.5. | 2. | Virtual | |
| Learning Manager 3. | Learning Manager Enterprise | _ | -U 2. | Campus Edition 3. |
| Campus Edition 4. | Campus Edition 4. | Campus Edition 6. | Vista 2. | Vista 3. |
| Vista | | | | |

Check the products above you wish to run a comparison for.

You may select up to **10** Products for a comparison.

Product Comparison >>

**or Suggestions?**

# Semi-structured interview (Facilitators only)

Questions for this instrument are divided into the following seven (7) main categories:

**1. Activity Level**
Questions for category one establish "what level of the 3 activity levels does the facilitator operate?" followed by 'why' questions.

**2. Subject**
Questions for category two establish "what personal qualities / web experience / knowledge / skills does the facilitator have?" followed by 'why' questions.

**3. Object**
Questions for category three establish "what other pedagogical issues does the facilitator use in conjunction with constructivism?" followed by 'how and why' questions.

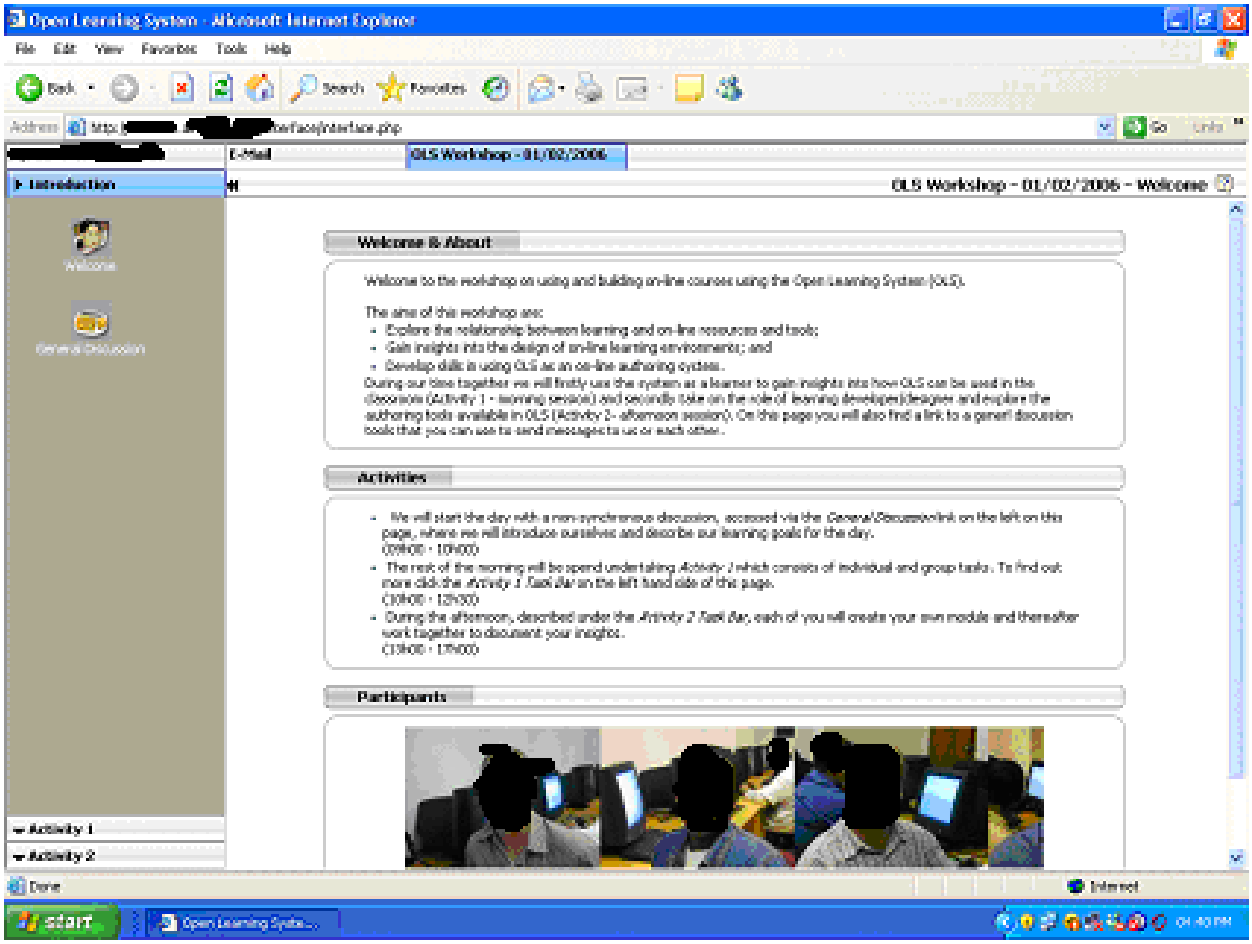
**4. Tool**
Questions for category four establish "what tools does the facilitator use in designing and managing his / her web learning / teaching space?" followed by 'how and why' questions.

**5. Community**
Questions for category five establish "how does the facilitator involve learners, technicians, other facilitators, support staff and university management members in his / her web learning / teaching web space?" followed by 'why' questions.

**6. Rules**
Questions for category six establish "what rules (teaching / learning and network rules) do the facilitators and community follow in the use of their teaching / learning space?" followed by 'how and why' questions.

**7. Division of labour**
Questions for category seven establish "what role do learners and other community members play in the facilitator's learning / teaching web space?" followed by 'how' questions.

**Respondent 1a's Design**



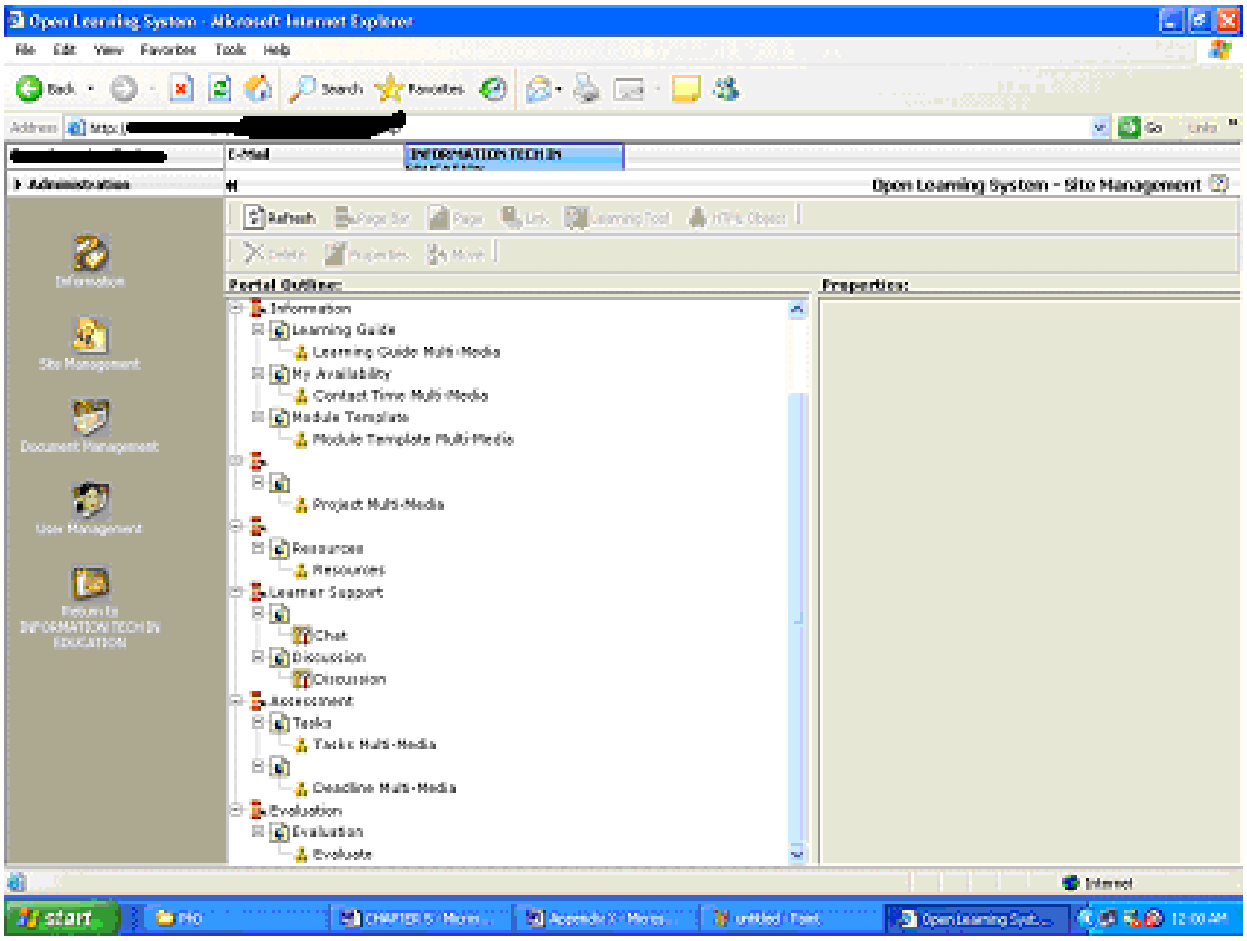

- It has 'Welcome & About';
- Activities (Activity 1 and Activity 2); and
- Participants' photographs.

**Design Feature 1 with different options**

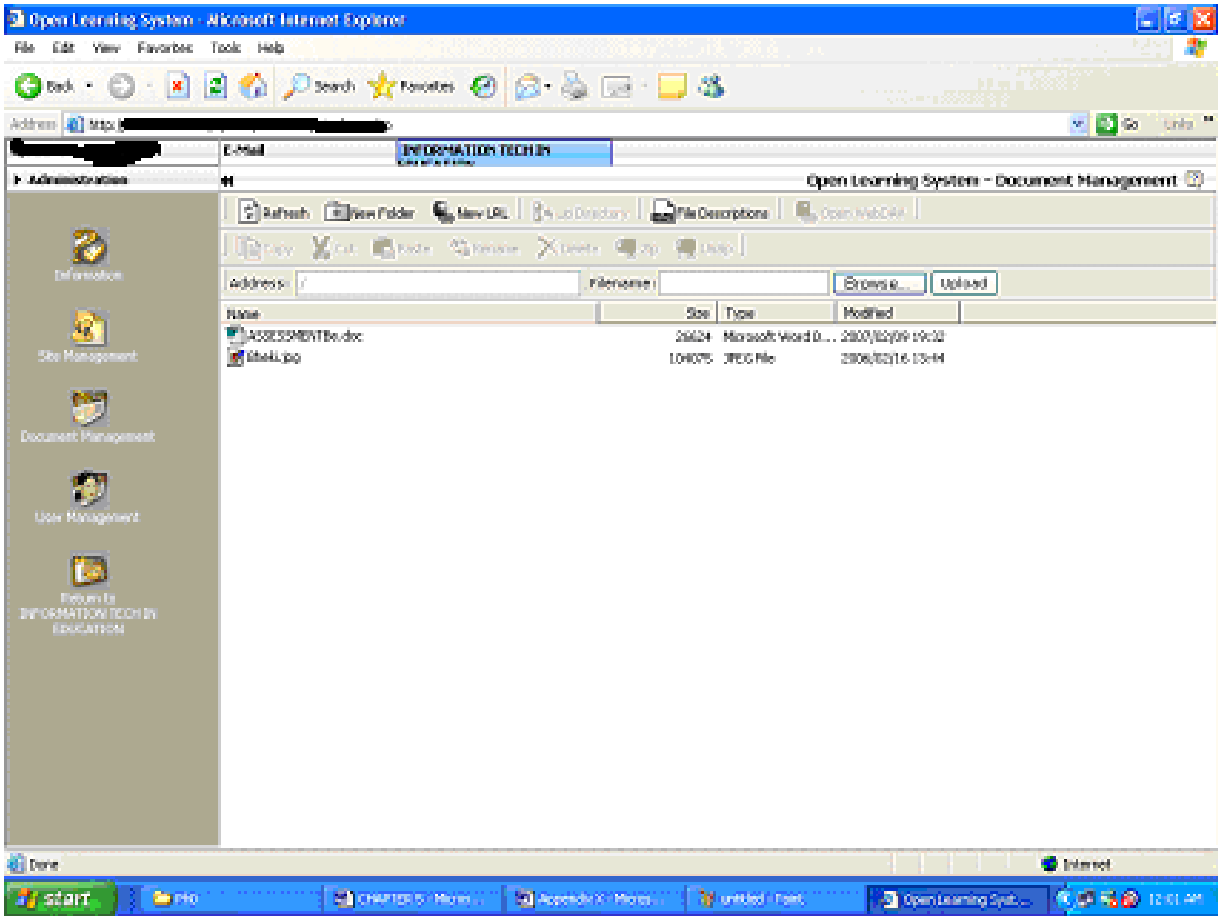

It has the following headings:

- Information
- Site Management
- Document Management
- User Management
- Return to menu

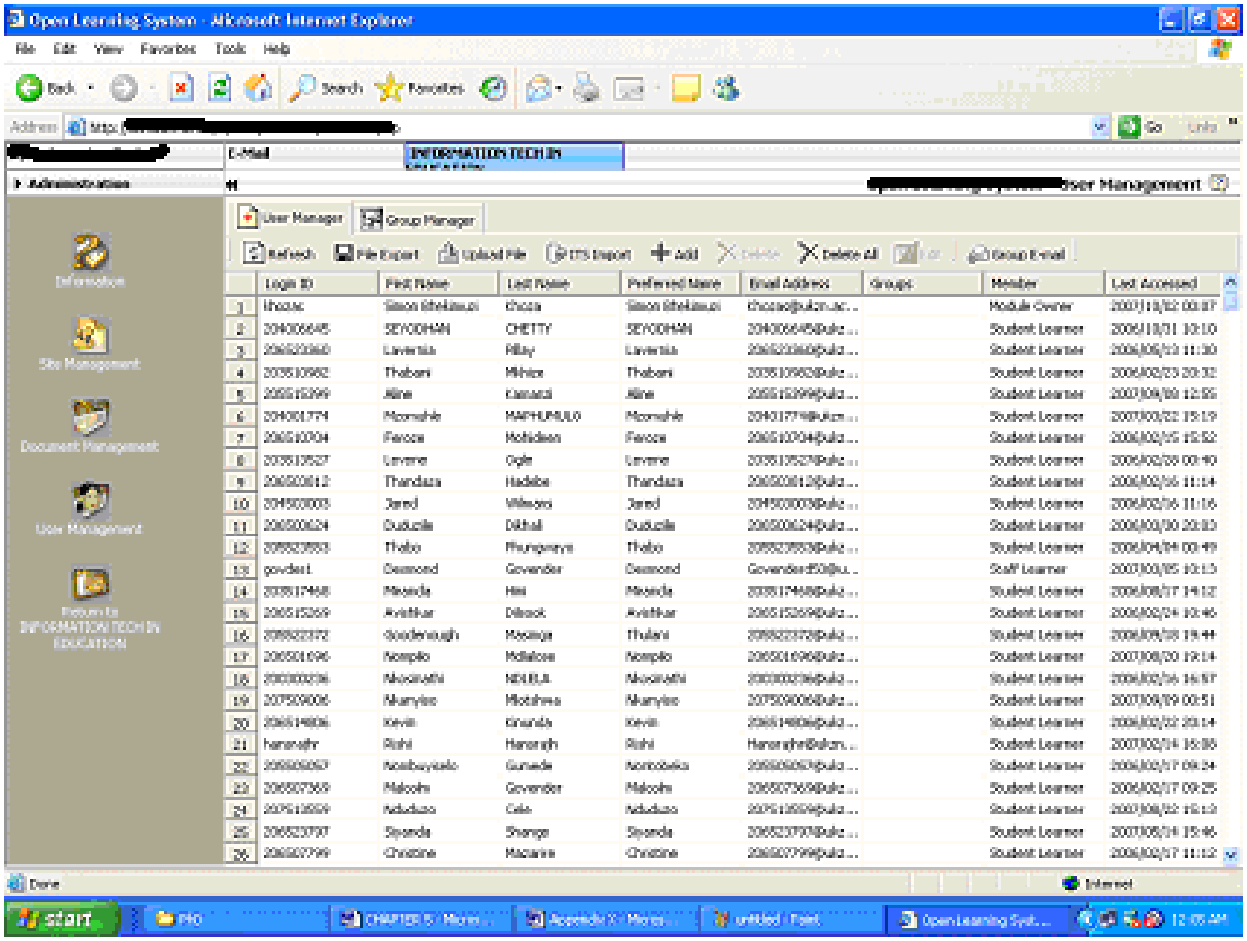
**Design Feature 2 with site management structure**



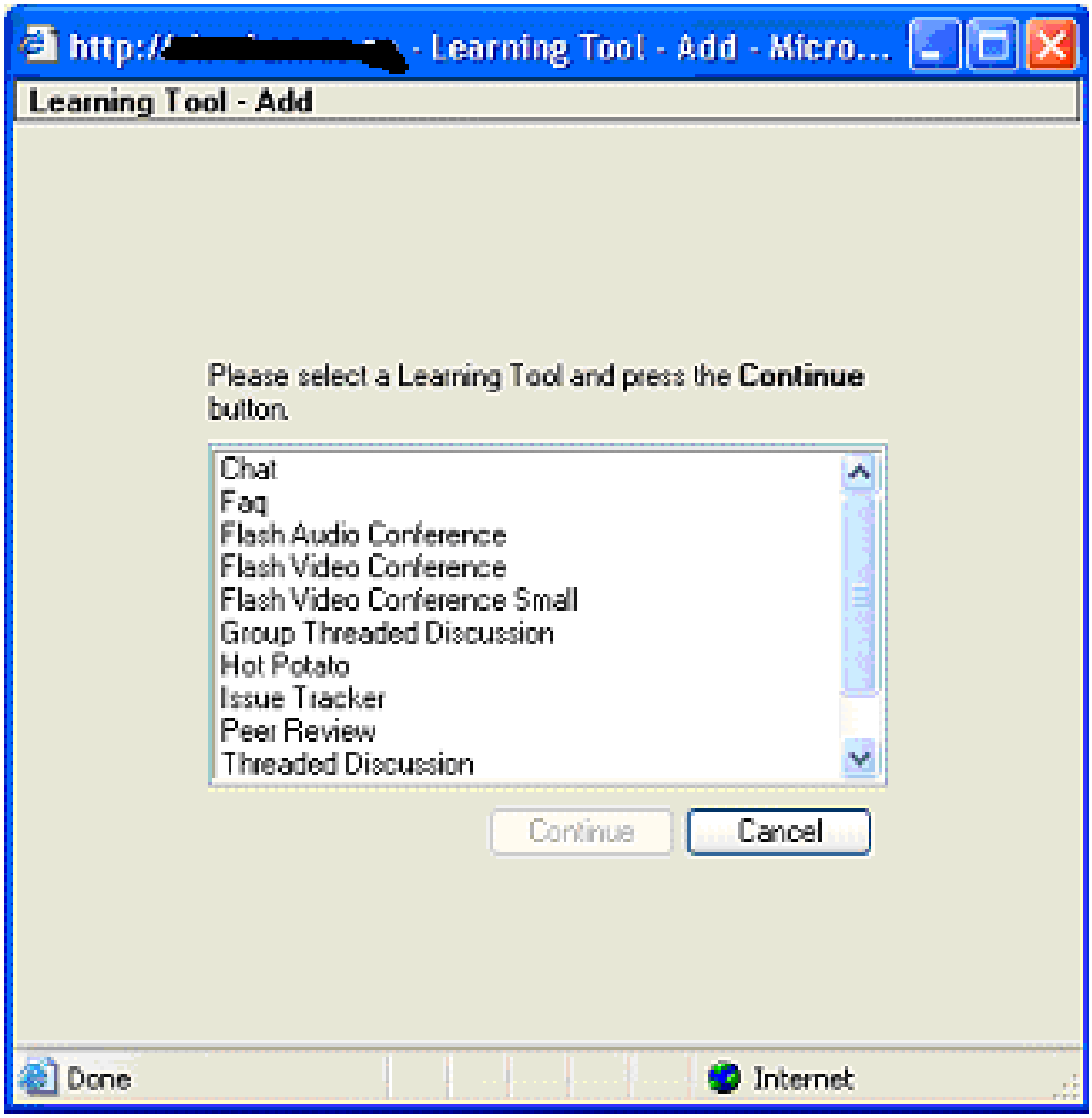
**Design Feature 3 with document management part**



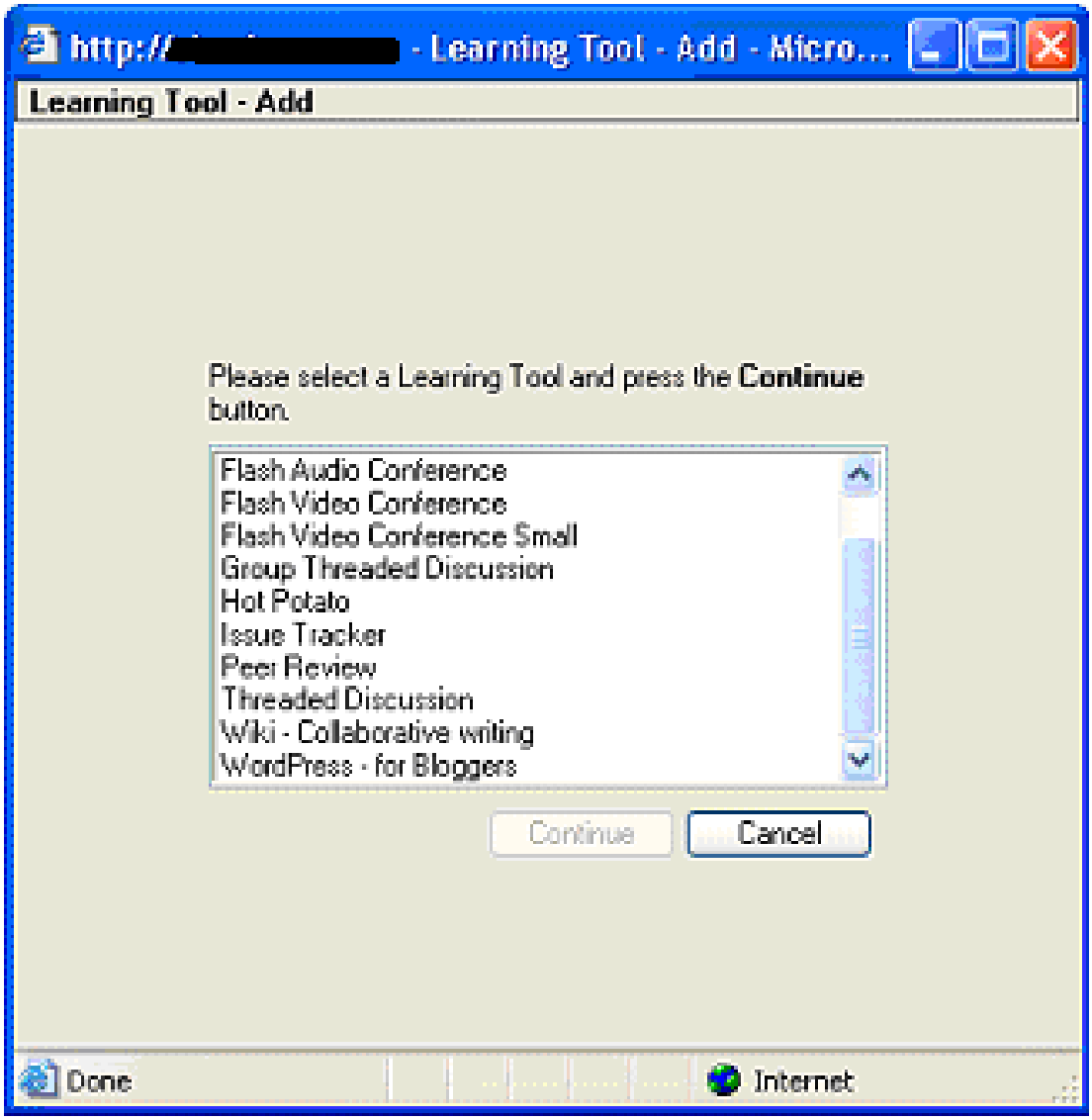
**Design Feature 4 with user management option & users**



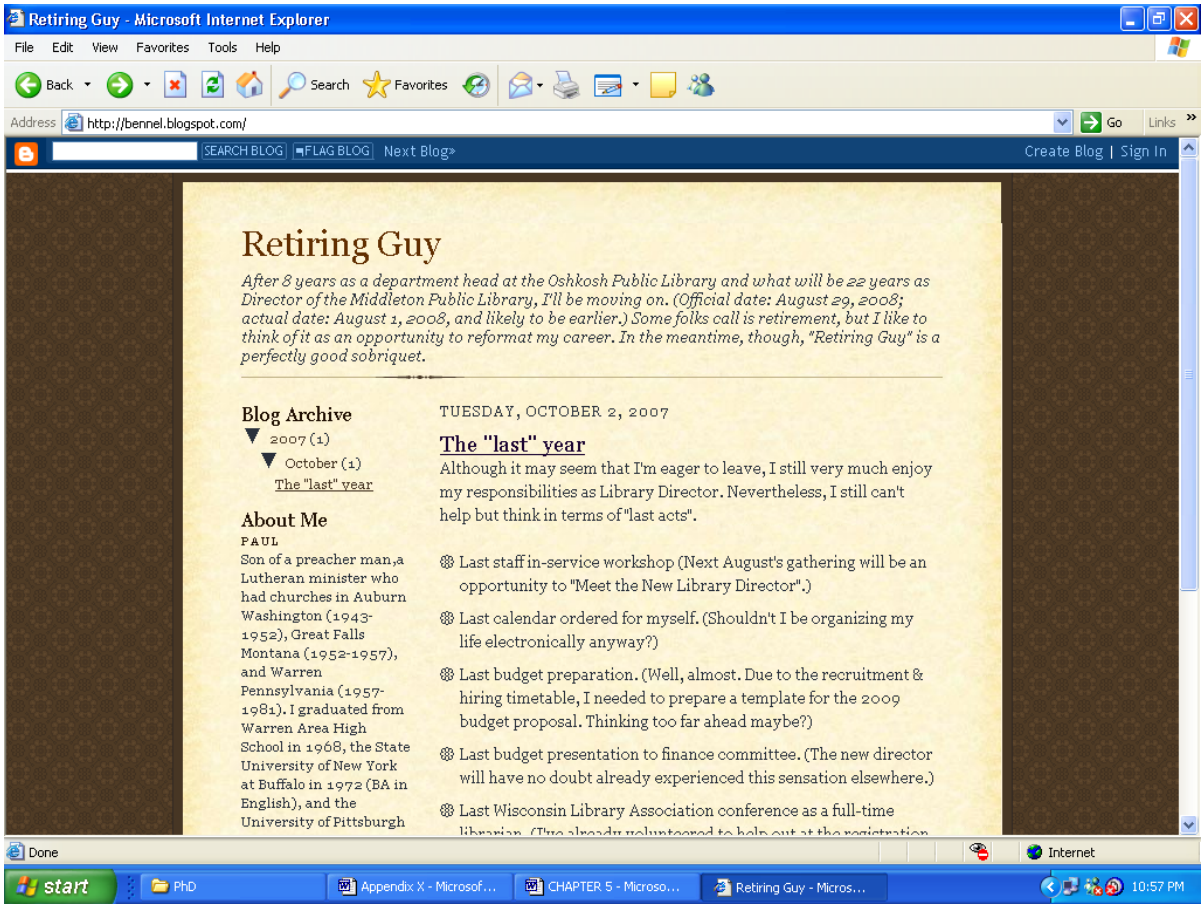
**Design Learning Tool available**



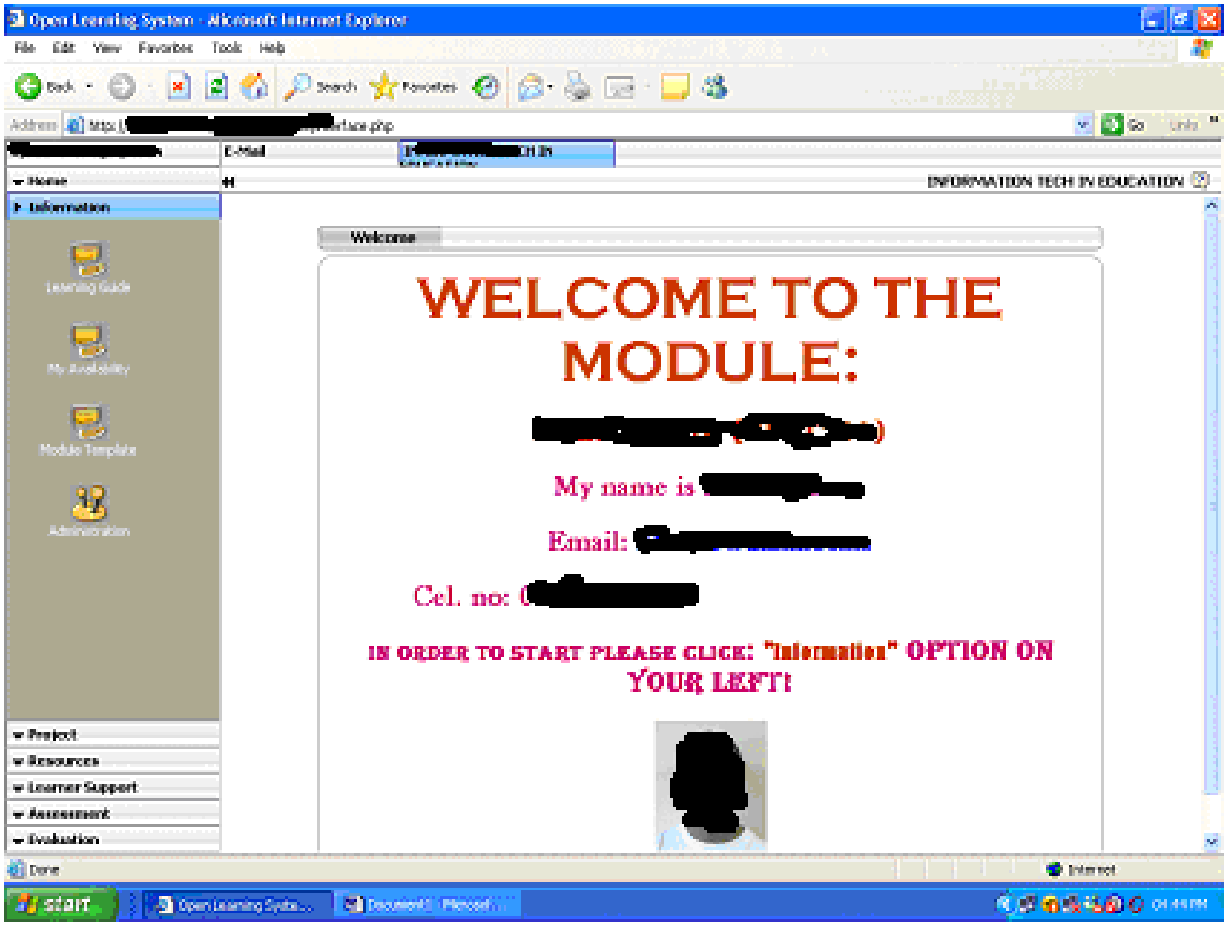
**Design Learning Tool available**



## Respondent 1b's Design



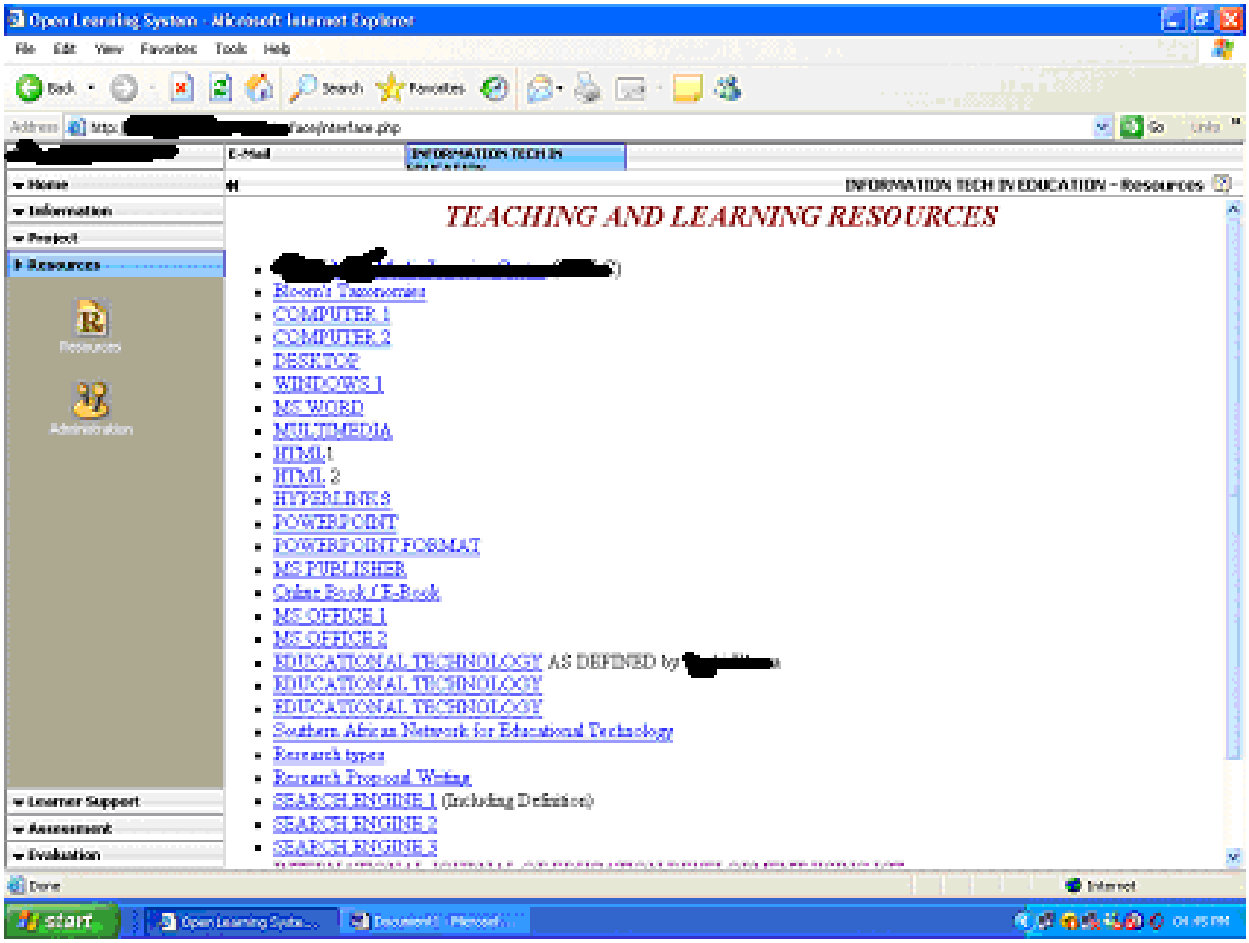
**Respondent 2a's Design**



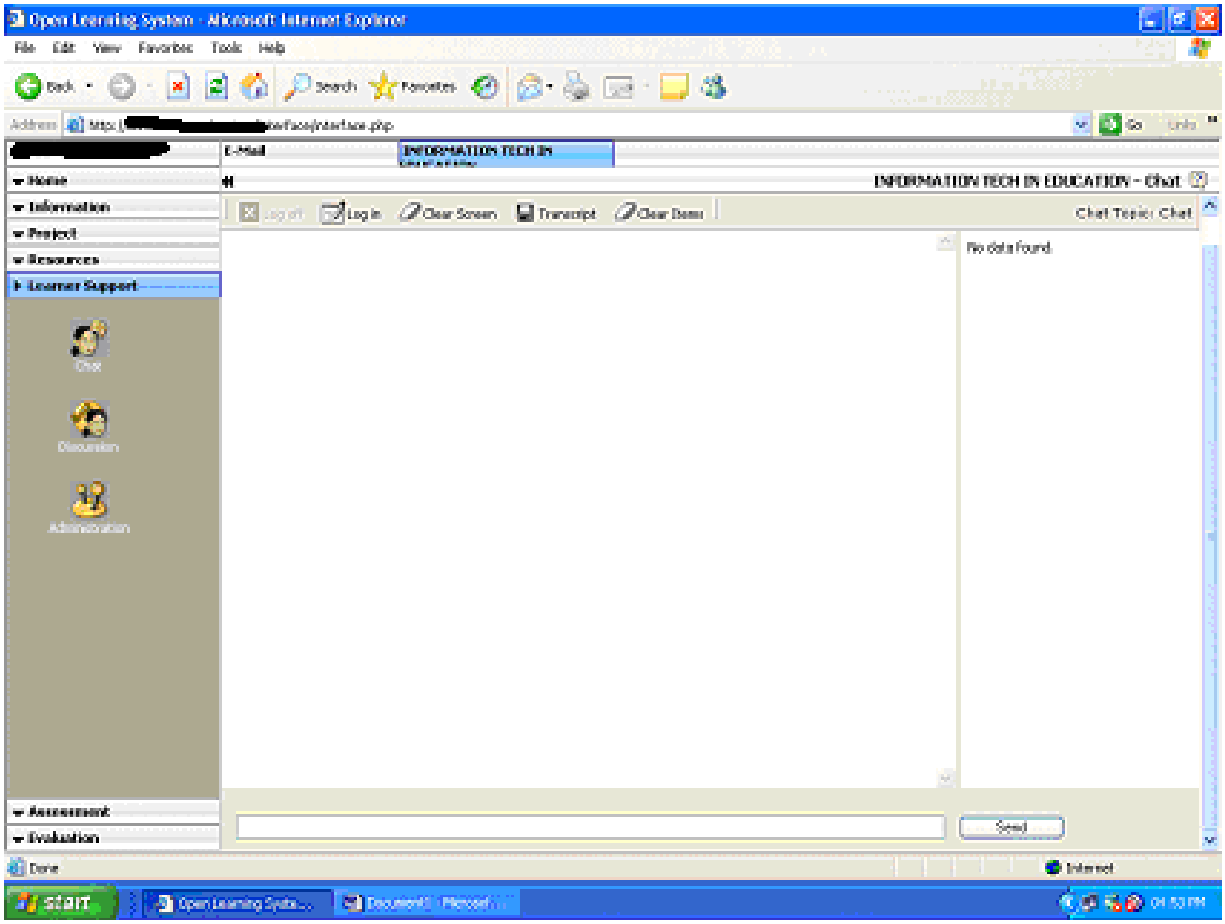

It has the following:

- Information with 'learning guide', 'my availability', 'module template' and 'administrator';
- Projects;
- Resources with list of different resources;
- Learner Support with 'chat & discussion';
- Assessment; and
- Evaluation.

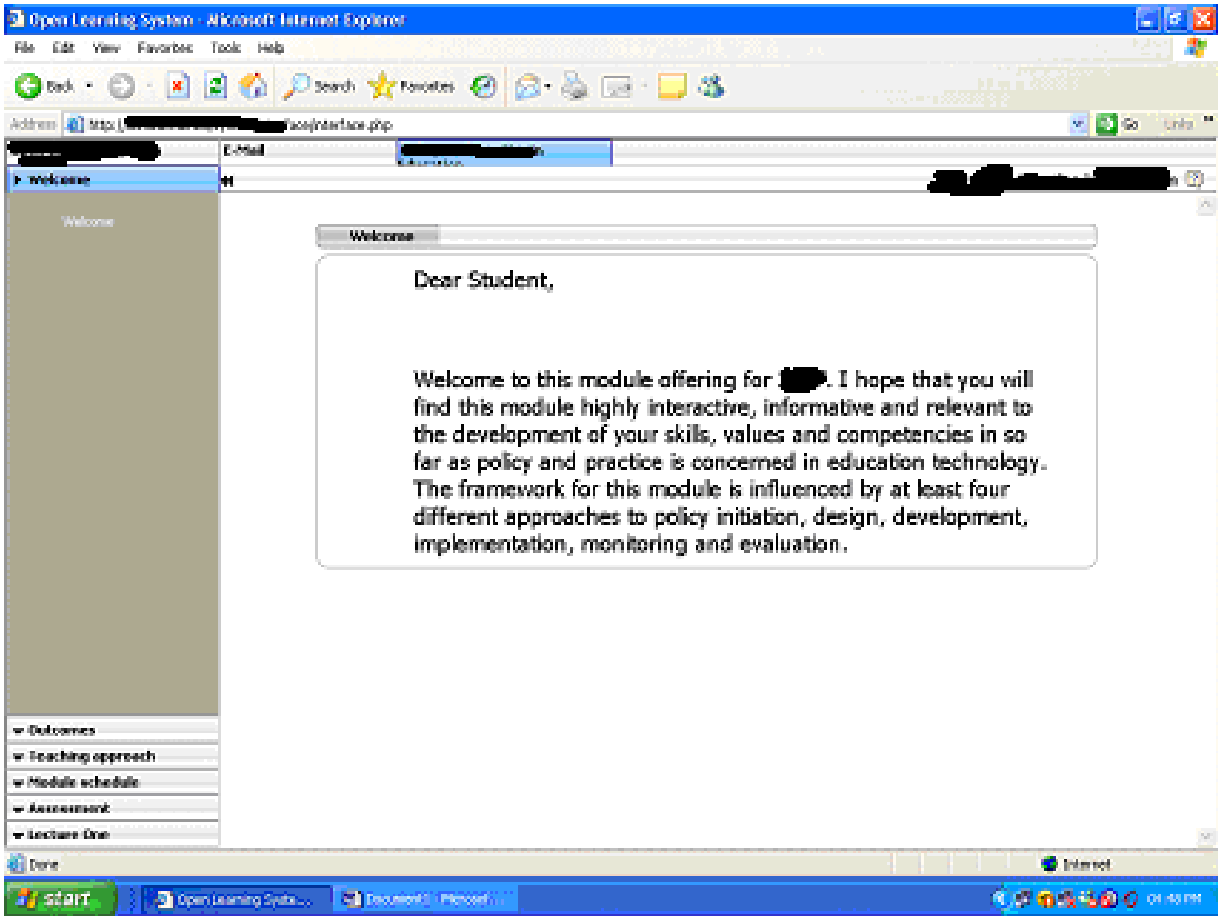
**Respondent 2a's Design showing Resourses**



**Respondent 2a's Design showing, 'Chat'**



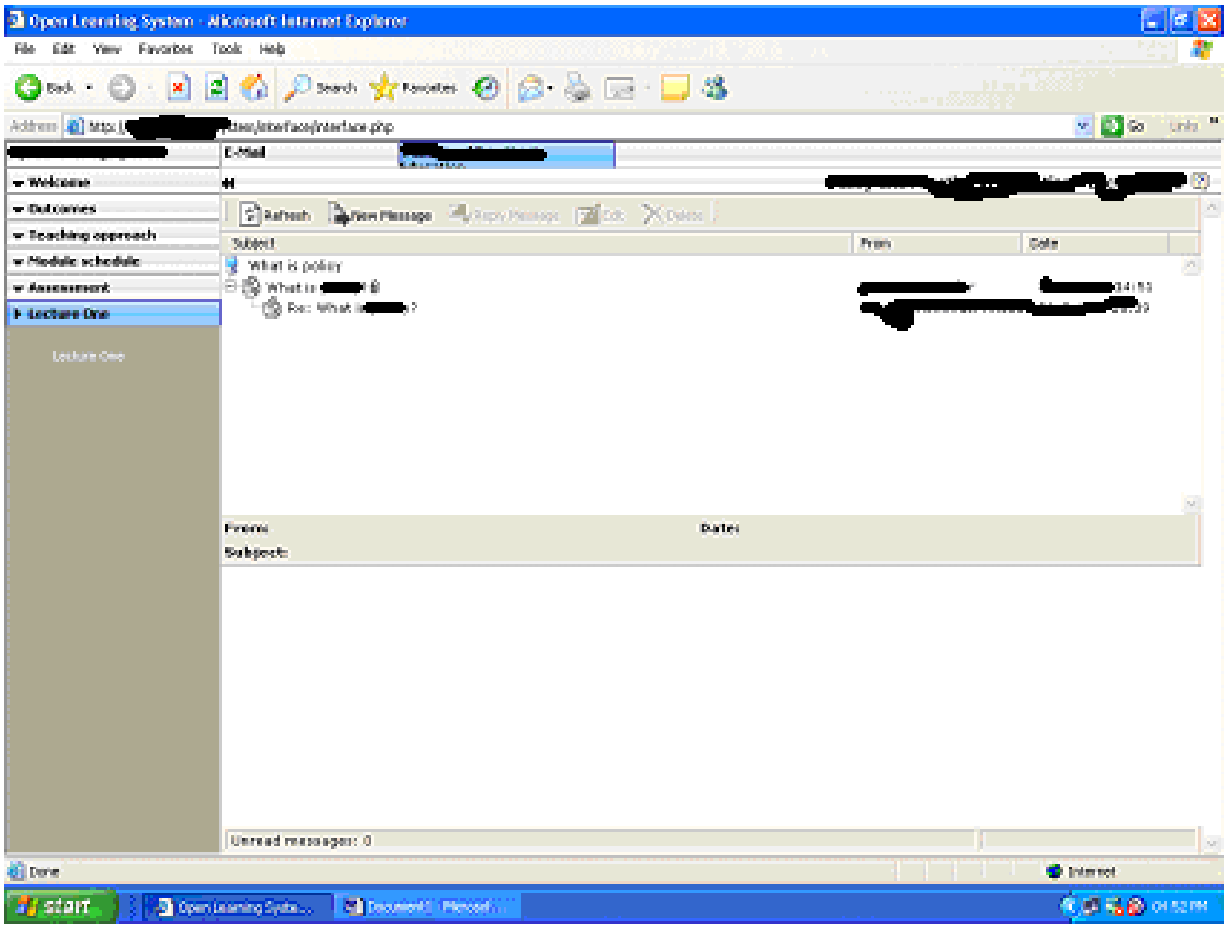
**Respondent 4b's Design**



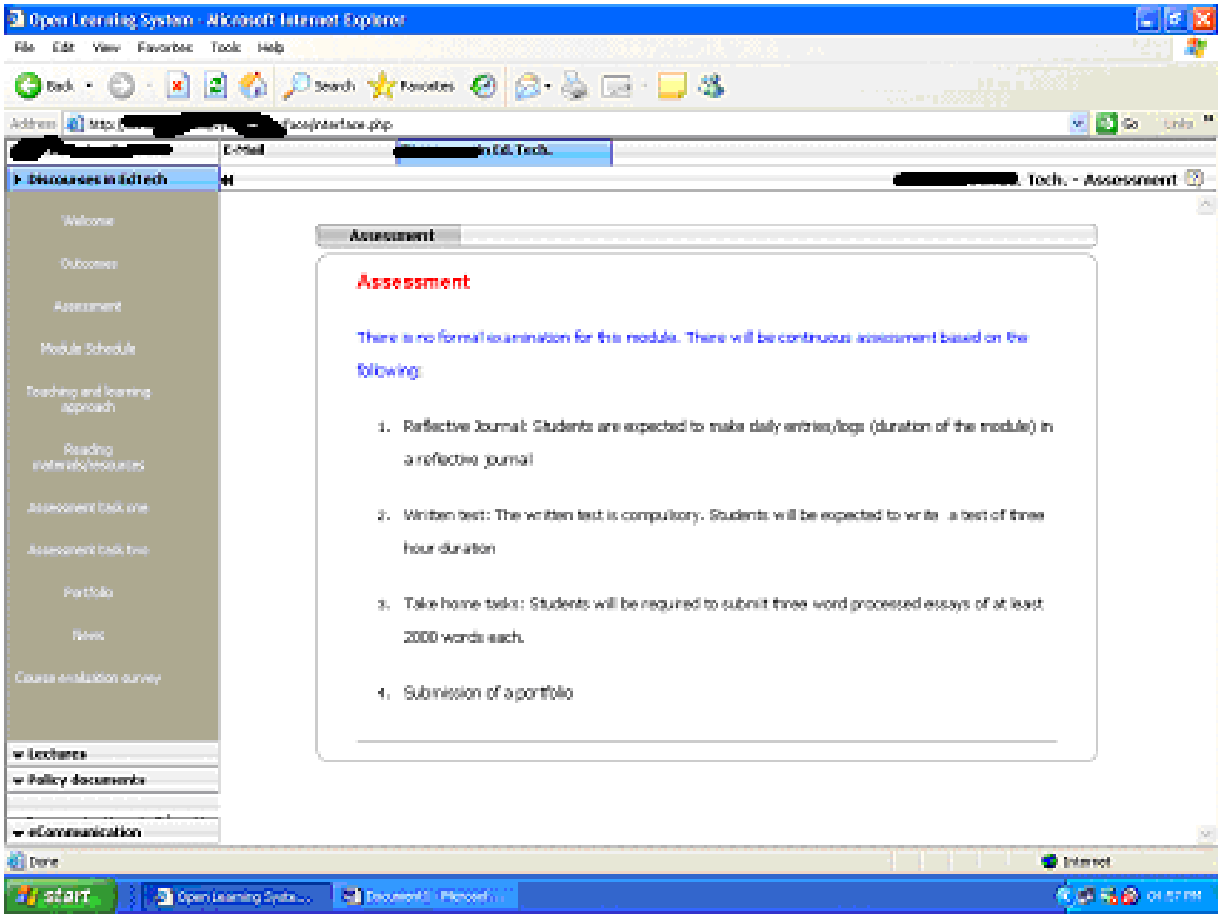

It has the following:

- Welcome;
- Outcomes;
- Teaching approach;
- Module welcome;
- Assessment; and
- Lecture one.

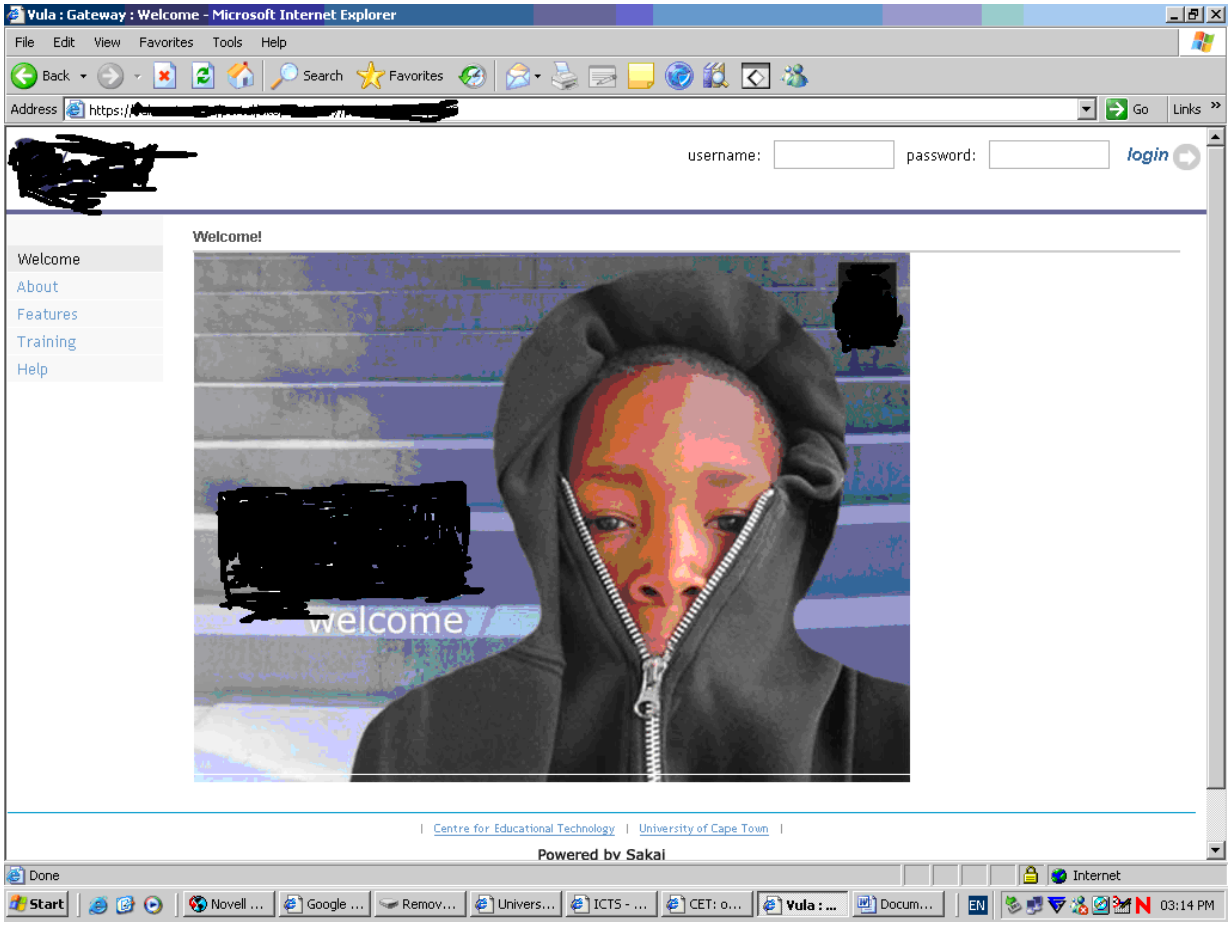
**Respondent 4b's Design showing 'Discussion'**



**Respondent 4b's Design showing Assessment**



## Respondent 3a & Respondent 3b's main picture of the design



# Marking Schedule for PowerPoint

| Description | Min. Mark= 1 | Max. Mark=3 |
|---|---|---|
| 1. Introduction with name, contact number and photograph. | | |
| 2. All slides with transition | | |
| 3. All text animated | | |
| 4. All slides have one animated picture | | |
| 5. All slides with one design | | |
| 6. All slides with different background | | |
| 7. All slides with relevant content | | |
| 8. Relevant conclusion | | |
| **TOTAL = 24 Marks** | | |


Christine Davis
PO Box 889
Hillcrest
3610

14 - 12 - 2009

RE: Editing – SB Khoza, PhD Thesis

To Whom It May Concern

This letter serves to confirm that I have edited SB Khoza's full thesis (including appendices): **Design analysis of Education Technologist's Web-Based Teaching and learning environments in South African Higher Education institutions.**

Media 4 Change does not add new content or research material to the papers we edit.

Sincerely,
Christine Davis,
Director
Media 4 Change
@m4c.co.
+27 (031)765 7235

RESEARCH OFFICE (GOVAN MBEKI CENTRE)
WESTVILLE CAMPUS
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EMAIL : ximbap@ukzn.ac.za

UNIVERSITY OF
KWAZULU-NATAL

6 MARCH 2007

MR. SB KHOZA (98042243)
EDUCATION STUDIES

Dear Mr Khoza

ETHICAL CLEARANCE APPROVAL NUMBER: HSS/0435/06D

I wish to confirm that ethical clearance has been granted for the following project:

"Design analysis of Educational Technologist's Web-Based Teaching and Learning environments in South African Higher Education institutions"

Yours faithfully

MS. PHUMELELE XIMBA
RESEARCH OFFICE

cc Faculty Research Office (Derek Buchler)
cc Supervisor (Prof. G Kistan)

2007 -03- 09

## **Student's Report:** SB Khoza 9804243

**Title:** Design analysis of Educational Technologist's Web-Based Teaching and Learning environments in South African Higher Education institutions

**Internal Examiner**

| Internal Examiner's comment | Action | Evidence |
|---|---|---|
| 1. The title of the thesis is confusing: This is exacerbated by the letter from the Faculty post-graduate office, which has a different title for the thesis | The correct title is "Design analysis of Educational Technologist's Web-Based Teaching and Learning environment in South African Higher Education institutions" | Title Page and Appendix xiii (Ethical clearance). |
| 2. It is not clear why the respondents to this study are anonymous. At the very least the institution could be identified so that the examiner would have some idea of the context in which the comments are made | The respondents did not want their names and names of their institutions to be revealed as explained in Chapter 3 on Methodology under Sampling. However they did allow me to use their Universities' Vision or Mission statements which should help the examiner to have some idea of the context in which the comments are made. | Chapter 3: Section 3.2.4 Sampling |
| 3. The conclusions that are drawn by the researcher are standard "textbook" recommendations that have no direct link to the study. | The 5 recommendations (Section 6.2.1) are not standard textbook recommendations because they are based on the 5 themes (Section 4.2.2) that I used in chapter 4 to discuss and summarise the findings for the first two research questions. The recommended study is mostly based on section 4.3.2 and other key findings of this study. | Chapter 6: section 6.2.1 is link to Chapter 4: section 4.2.2 and section 5.2 |
| 4. The researcher has often relied upon references that are 10 to 20 years old… How can a reference from 2002 relate to the last decades? | Beatty (2002) was referring to the then 'last two decades'. Other references are becoming older because the marking process for this thesis has taken a long time. However, I have replaced others with new ones especially those that are not dealing with history. | Section 5.6 |

| | | |
|---|---|---|
| 5. On page 17 the researcher references a work from 1988 wherein 'diskettes, transparencies, video cassettes' are regarded as current technologies! Not in 2009! | On this page these resources are not indicated as the current technologies although in Educational Technology are still being used in some cases. Here they are only used as examples to explain one of the two concepts of Educational Technology (Technology in Education - software) which is different from that of Computer Science. However, I have replaced the diskettes and cassettes with DVDs but it is not possible to have any latest resource to replace transparencies. | Section 2.2: Educational Technology |
| 6. Numerous statements / sentences in the thesis make no sense. For example on page 20 the researcher writes: "to be clear about ambiguity is important…" | I have changed all the statements that include ambiguity. I also sent it to the editor to edit it again in order to remove or re-structure the statements or sentences that did not make sense. | Section 2.3.1.1: Knowledge of self Appendix xii (editing certificate) |
| 7. On page 117 the researcher makes the following statement: "Although the current change context of WBTL is more demanding … | I have contextualized it with relevant sources. | Section 5.2.2: Currently change context |
| 8. The study makes various recommendations about WBTL at universities, and suggests that these recommendations are necessary for the advancement of the Government goals for education. It must be noted that the researcher only considered 4 institutions with 48 participants….. The conclusion drawn about the required abilities of WBTL facilitators are biased …. There are many academics at Universities that utilize WBTL. These academics have not been studied or approached for this study. | The recommendations have not been generalized for this study because it is a case study which studied only Educational Technologists from the four identified institutions. | Chapter 3 Section 3.2.3: Research methodology employed in this study. |

**National Examiner**

| National Examiner's comment | Action | Evidence |
|---|---|---|
| **5. Assessment:** The candidate …and made a detailed discussion of the findings. However, the candidate has not made any recommendation for further research. This could… | The recommendation made for further research was made after the 5 recommendations in section 6.2.1 | Chapter 6: section 6.2.1 |
| **6. Literary style and presentation:**<br>• the study has few grammatical errors,<br>• few unnecessary use of the researcher,<br>• few authors omitted,<br>• the last page has no number and<br>• Chapter 4, 5 and 6 have sections which could be rearranged to enable logical flow of ideas. | I had to read it first and work on all the recommended changes before it was sent to the editor again to take care of all grammatical errors and omitted authors. I added the missing page number of the last page and I have rearranged section 6.2.2 to become section 5.3 in order to be placed before section 5.4 as recommended. | Appendix xii (editing certificate) and Appendix xiii (last page ethical clearance) and Chapter 5: section 5.3 |
| Website should appear in the bibliography | I have used website in the text only where it is not possible to get a page number to cite the direct quotation. | All Chapters |

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Signed by SB Khoza Date